MITSUBISHI ELECTRIC

Changes for the Better

SERVO AMPLIFIERS & MOTORS

MR-E

User-friendly servo with easy operation

Mitsubishi Electric Corporation Nagoya Works is a factory certified for ISO14001 (standards for environmental management systems) and ISO9001(standards for quality assurance management systems)

MELSOFT

TÜV Rheinland

EC97J1113

051

Certified ISO 9001 by

008

Competent footwork
Enhancing
EZMotion Ese

created by high performance and easy operations

the system cost performance

1. High Performance

●Integrating the MR-J2-Super's high performance

- High response is realized.
- High-accuracy positioning is possible.
- Gain settings can be performed easily by the advanced real-time auto-tuning function.
- Vibration can be suppressed by the adaptive vibration control function.
- Optimum tuning is possible with a personal computer and the setup software.
- 2 types of the pulse train interface (position control or speed control operation) and the analog input interface (speed control or torque control operation) are provided.

2. Easy To Use

●Easy operation

- Connectors have been installed on the fore part of the servo amplifier, thereby connecting the cables easily.
- Connectors have been adapted for the servo amplifier terminal block, thereby reducing the time required for wiring.
- The MR-E series is compatible with the MR-J2-Super series for setting.

3. Global Standard Products

●Compatible with global standards

- The MR-E standard specifications conform to EN, UL and cUL standards.

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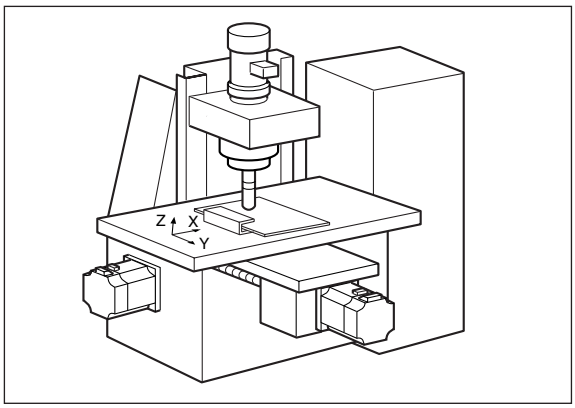
Applications

Extensive applications

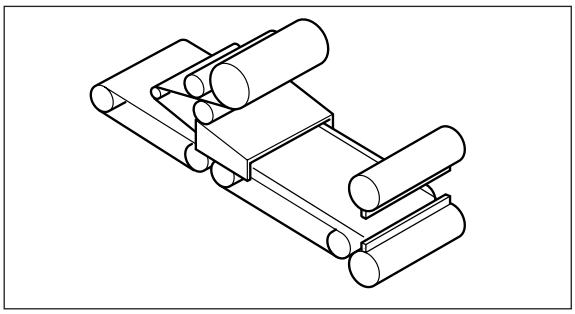
Processing machines or machine tool feed



Grinding machines
Transfer machines
Loaders/unloaders
Wood working machines
Dedicated machines

Various positioning can be completed easily with pulse trains.

Food processing machines, packing machines or feeders

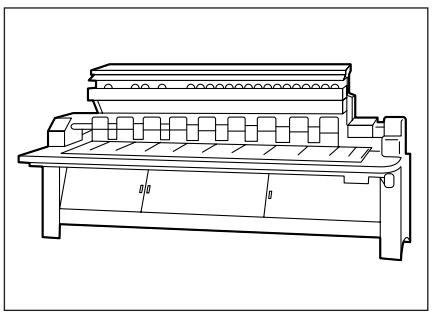


Pillow packing machines
Filling machines
Label printing, label attaching machines
Bag manufacturing machines
Press feeders
Roll feeders

The IP65 compatible motor can be used safely for food processing applications.

For various applications,
Mitsubishi AC servo
MR-E Series

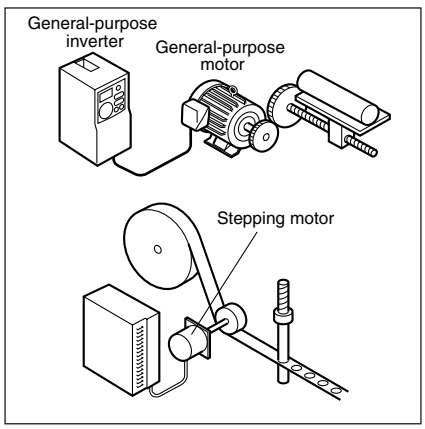
Textile machines



Weaving machines
Embroidery machines
Knitting machines
Winding machines
Stranding machines
Paper manufacturing machines

High-speed and high-accuracy applications are possible, enabling easy replacement with conventional devices.

Enhancing machine performance



Replacement of inverters, stepping motors or DC servos
Replacement from clutch, mechanical structure systems or hydraulic/air cylinders

By using the servo as an alternative to legacy products, higher quality can be achieved.

Servo Motor Features/Model Configurations

Servo Motor Series

Motor series		Rated speed (maximum speed) (r/min)	Rated output (kW)	With electro-magnetic brake (B)	Global standards: EN	Global standards: UL cUL	Protection level	Feature	Application examples
Small capacity series	●HF-KE series	3000 (4500)	4 types 0.1, 0.2, 0.4, 0.75	○	○	○	IP65 Excluding the shaft-through portion and connector	Stable control from low speeds to high speeds allows compliance with a variety of applications.	● Belt drive ● Robots ● Mounters ● Sewing machines ● X-Y tables ● Food processing machines
Medium capacity series	●HF-SE series	2000 (3000)	4 types 0.5, 1.0, 1.5, 2.0	○	○	○	IP65 Excluding the shaft-through portion		● Conveyor machines ● Robots ● X-Y tables

Note: A ○ mark shows production range.

Model Configurations

■For servo amplifier

MR-E- 10 A

Mitsubishi general-purpose AC servo amplifier MR-E Series

A : Pulse train interface
AG : Analog input interface

List of compatible motors

Symbol	HF-KE	HF-SE
10	13	—
20	23	—
40	43	—
70	73	52
100	—	102
200	—	152, 202

Note: There are some motors that cannot be connected depending on the amplifier's software version.
Refer to the servo motor specifications in this catalog.

●Conforms to following standards: EN, UL and cUL

■For servo motor

HF-KE 1 3 B □

Symbol	Motor series
HF-KE	Low inertia, small capacity
HF-SE	Medium inertia, medium capacity

Symbol	Rated output (kW)
1 to 7	0.1 to 0.75
10 to 20	1.0 to 2.0

Symbol	Rated speed (r/min)
2	2000 (Note 1)
3	3000 (Note 2)

Notes: 1. 2000r/min is only for HF-SE series.
2. 3000r/min is only for HF-KE series.

Symbol	Electromagnetic brake
None	None
B	Installed

Note: Refer to "Electromagnetic brake specifications" in this catalog for the compatible models and detailed specifications.

Symbol	Shaft end
None	Standard (Straight shaft)
K	Key way or with key (Note)
D	D-cut (Note)

Note: Refer to "Special shaft end specifications" in this catalog for the compatible models and detailed specifications.

●Conforms to following standards: EN, UL and cUL

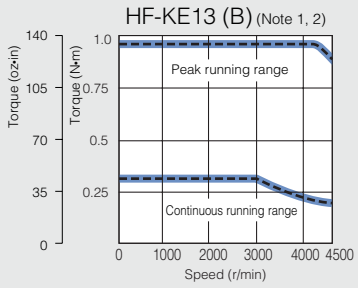
Motor Specifications and Characteristics

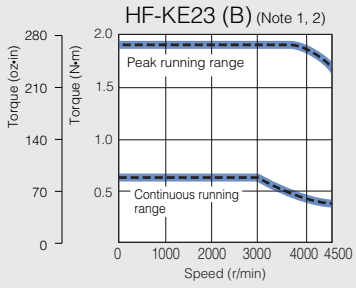
HF-KE series servo motor specifications

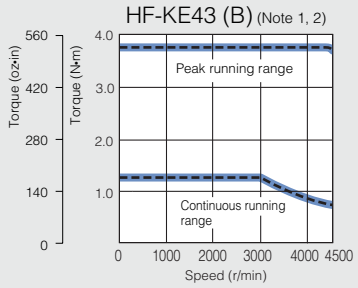
Servo motor series			HF-KE series (Low inertia, small capacity)			
Models / Specifications		Servo motor model	HF-KE13 (B)	HF-KE23 (B)	HF-KE43 (B)	HF-KE73 (B)
		Servo amplifier model	MR-E-10A/AG (Note 9)	MR-E-20A/AG (Note 9)	MR-E-40A/AG (Note 9)	MR-E-70A/AG (Note 9)
Servo motor	Power facility capacity (Note 2) (kVA)		0.3	0.5	0.9	1.3
	Continuous running duty	Rated output (W)	100	200	400	750
		Rated torque (N·m [oz·in])	0.32 (45.3)	0.64 (90.6)	1.3 (184)	2.4 (340)
	Maximum torque (N·m [oz·in])		0.95 (135)	1.9 (269)	3.8 (538)	7.2 (1020)
	Rated speed (r/min)		3000			
	Maximum speed (r/min)		4500			
	Permissible instantaneous speed (r/min)		5175			
	Power rate at continuous rated torque (kW/s)		11.5	16.9	38.6	39.9
	Rated current (A)		0.8	1.4	2.7	5.2
	Maximum current (A)		2.4	4.2	8.1	15.6
	Regenerative braking frequency (times/min) (Note 3, 4)	With no options	(Note 5)	(Note 5)	249	140
		MR-RB032 (30W)	(Note 5)	(Note 5)	747	210
		MR-RB12 (100W)	—	(Note 5)	2490	700
		MR-RB32 (300W)	—	—	—	2100
	Moment of inertia J ($\times 10^{-4}$kg·m^2) [J (oz·in^2)]	Standard	0.088 (0.481)	0.24 (1.31)	0.42 (2.30)	1.43 (7.82)
		With electromagnetic brake	0.090 (0.492)	0.31 (1.70)	0.50 (2.73)	1.63 (8.91)
	Recommended load/motor inertia moment ratio		15 times the servo motor's inertia moment maximum (Note 6)			
	Speed/position detector		Incremental encoder (resolution per servo motor rotation: 16384 p/rev)			
	Attachments		—			
	Structure		Totally enclosed non ventilated (protection level: IP55) (Note 1, 7)			
	Environment	Ambient temperature	0 to 40°C (32 to 104°F) (non freezing), storage: –15 to 70°C (5 to 158°F) (non freezing)			
		Ambient humidity	80% RH maximum (non condensing), storage: 90% RH maximum (non condensing)			
		Atmosphere	Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust			
		Elevation/vibration (Note 8)	1000m or less above sea level; X: 49m/s^2 Y: 49m/s^2			
	Mass (kg [lb])	Standard	0.56 (1.3)	0.94 (2.1)	1.5 (3.4)	2.9 (6.4)
		With electromagnetic brake	0.86 (1.9)	1.6 (3.6)	2.1 (4.7)	3.9 (8.6)

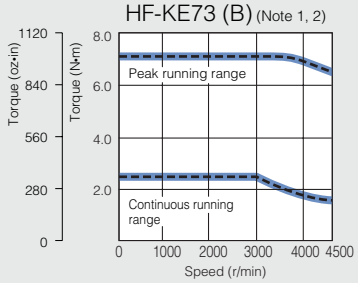
Notes: 1. If used in location such as actual site of machinery where oil or water may contact the product, special specifications apply, so contact Mitsubishi.
2. The power facility capacity varies depending on the power supply's impedance.
3. The regenerative braking frequency shows the permissible frequency for decelerating the motor without a load from the rated speed to a stop. When a load is connected, however, the value becomes the table value divided by (m+1) where m is the load inertia moment divided by the motor inertia moment. When the operating speed exceeds the rated speed, the regenerative braking frequency is inversely proportional to the square of (Operating speed/rated speed). When the operating speed varies frequently or when regeneration is constant (as with vertical feeds), find the regeneration heat generated (W) while operating. The heat should not exceed the tolerable regenerative power (W). Refer to the section "Options ●Optional regeneration unit" in this catalog for details on the tolerable regenerative power (W).
4. The regenerative braking frequency of the 600W and smaller servo amplifier may fluctuate due to the affect of the power voltage since the energy charged by the electrolytic capacitor in the servo amplifier is large.
5. There are no limits on regeneration frequency as long as the effective torque is within the rated torque range. However, the load/motor of inertia moment ratio must be 15 times or less.
6. Contact Mitsubishi if the load/motor of inertia moment ratio exceeds the value in the table.
7. The shaft-through portion and connector for cable terminal are excluded.
8. The vibration direction is shown in the right-side diagram. The numeric value indicates the maximum value of the component (commonly the bracket in the opposite direction of the motor shaft). Fretting of the bearing occurs easily when the motor stops, so maintain vibration to approximately one-half of the allowable value.
9. The servo amplifier software is compatible with the HF-KE Series from version A5 or above.

HF-KE series servo motor torque characteristics







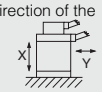


Notes:
1. ▬▬ : For 3-phase 200VAC.
2. - - - - : For 1-phase 230VAC.

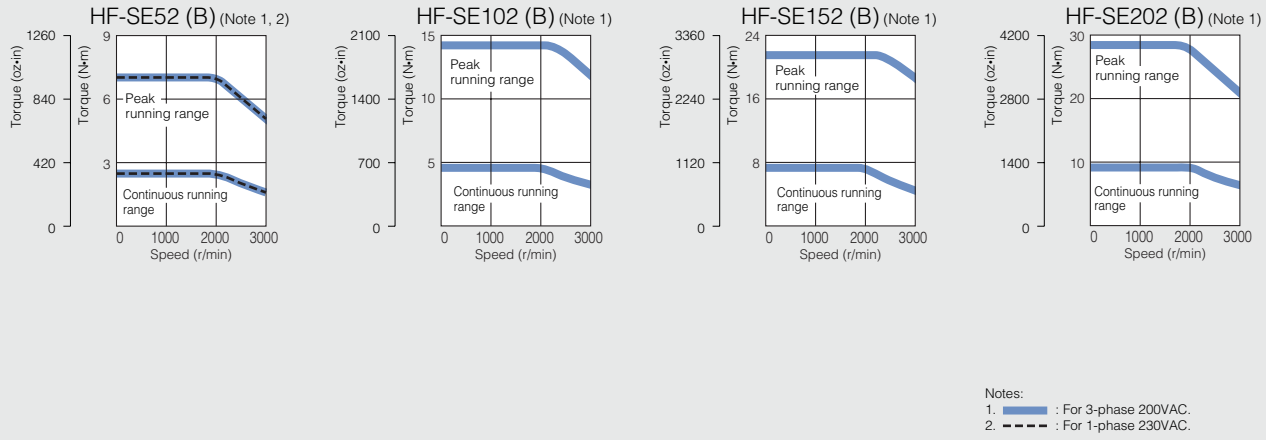
HF-SE series servo motor specifications

Servo motor series			HF-SE series (Medium inertia, medium capacity)			
Models / Specifications	Servo motor model		HF-SE52 (B)	HF-SE102 (B)	HF-SE152 (B)	HF-SE202 (B)
	Servo amplifier model		MR-E-70A/AG (Note 7)	MR-E-100A/AG (Note 7)	MR-E-200A/AG (Note 7)	
Servo motor	Power facility capacity (Note 1) (kVA)		1.0	1.7	2.5	3.5
	Continuous running duty	Rated output (kW)	0.5	1.0	1.5	2.0
		Rated torque (N·m [oz·in])	2.39 (338)	4.77 (675)	7.16 (1010)	9.55 (1350)
	Maximum torque (N·m [oz·in])		7.16 (1010)	14.3 (2020)	21.5 (3040)	28.6 (4050)
	Rated speed (r/min)		2000			
	Maximum speed (r/min)		3000			
	Permissible instantaneous speed (r/min)		3450			
	Power rate at continuous rated torque (kW/s)		9.34	19.2	28.8	23.8
	Rated current (A)		2.9	5.3	8.0	10
	Maximum current (A)		8.7	15.9	24	30
	Regenerative braking frequency (times/min) (Note 2, 3)	With no options	120	62	152	71
		MR-RB032 (30W)	180	93	—	—
		MR-RB12 (100W)	600	310	—	—
		MR-RB30 (300W)	—	—	456	213
		MR-RB32 (300W)	1800	930	—	—
		MR-RB50 (500W)	—	—	760	355
	Moment of inertia J (×10^{-4}kg·m^2) [J (oz·in^2)]	Standard	6.1 (33.4)	11.9 (65.1)	17.8 (97.3)	38.3 (209)
		With electromagnetic brake	8.3 (45.4)	14.0 (76.5)	20.0 (109)	47.9 (262)
	Recommended load/motor inertia moment ratio		15 times the servo motor's inertia moment maximum (Note 4)			
	Speed/position detector		Incremental encoder (resolution per servo motor: 16384 p/rev)			
	Attachments		—			
	Structure		Totally enclosed non ventilated (protection level: IP65) (Note 5)			
	Environment	Ambient temperature	0 to 40°C (32 to 104°F) (non freezing), storage: –15 to 70°C (5 to 158°F) (non freezing)			
		Ambient humidity	80% RH maximum (non condensing), storage: 90% RH maximum (non condensing)			
		Atmosphere	Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust			
		Elevation	1000m or less above sea level			
		Vibration (Note 6)	X,Y : 24.5m/s^2			X : 24.5m/s^2 Y : 49m/s^2
	Mass (kg [lb])	Standard	4.8 (11)	6.5 (15)	8.3 (19)	12 (27)
		With electromagnetic brake	6.7 (15)	8.5 (19)	11 (25)	18 (40)

Notes: 1. The power facility capacity varies depending on the power supply's impedance.
2. The regenerative braking frequency shows the permissible frequency for decelerating the motor without a load from the rated speed to a stop. When a load is connected, however, the value becomes the table value divided by (m+1) where m is the load inertia moment divided by the motor inertia moment. When the operating speed exceeds the rated speed, the regenerative braking frequency is inversely proportional to the square of (Operating speed/rated speed). When the operating speed varies with the frequency or when regeneration is constant (as with vertical feeds), find the regeneration heat generated (W) while operating. The heat should not exceed the tolerable regenerative power (W). Refer to the section "Options ●Optional regeneration unit" in this catalog for details on the tolerable regenerative power (W).
3. The regenerative braking frequency of the 600W and smaller servo amplifier may fluctuate due to the affect of the power voltage since the energy charged by the electrolytic capacitor in the servo amplifier is large.
4. Contact Mitsubishi if the load/motor of inertia moment ratio exceeds the value in the table.
5. The shaft-through portion is excluded.
6. The vibration direction is shown in the right-side diagram. The numeric value indicates the maximum value of the component (commonly the bracket in the opposite direction of the motor shaft). Fretting of the bearing occurs easily when the motor stops, so maintain vibration to approximately one-half of the allowable value.
7. The servo amplifier software is compatible with the HF-SE Series from version A5 or above.



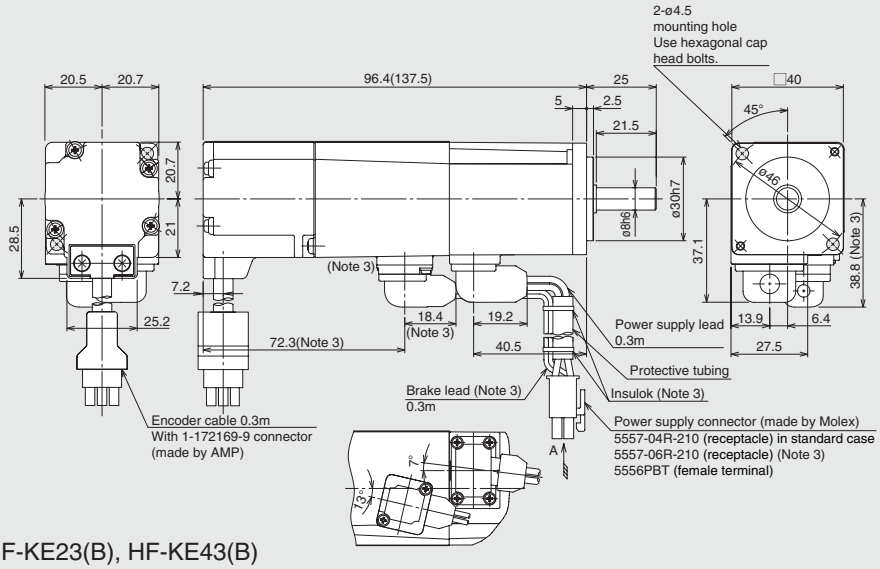
HF-SE series servo motor torque characteristics



Motor Dimensions

●HF-KE13(B)

(Unit: mm)



Standard

Power supply connector pin assignment

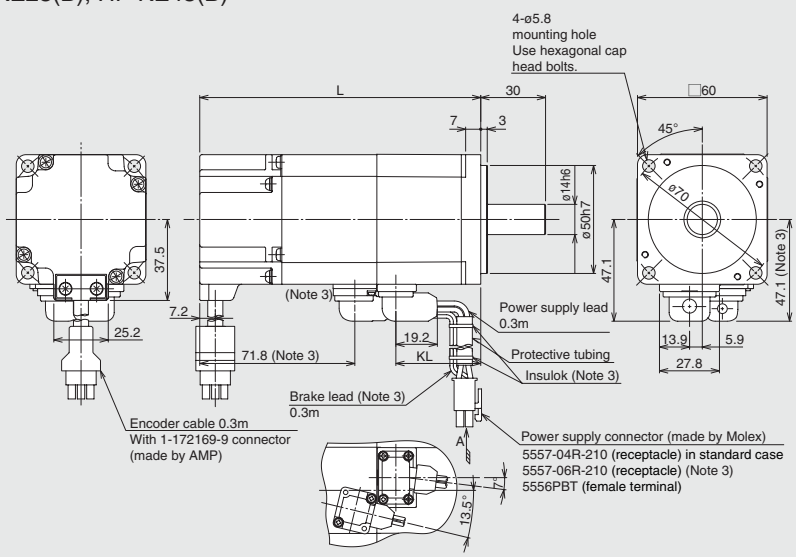
Pin No.	Signal name
1	U phase
2	V phase
3	W phase
4	Earth

with Brake

Power supply connector pin assignment

Pin No.	Signal name
1	U phase
2	V phase
3	W phase
4	Earth
5	B1
6	B2

●HF-KE23(B), HF-KE43(B)



Standard

Power supply connector pin assignment

Pin No.	Signal name
1	U phase
2	V phase
3	W phase
4	Earth

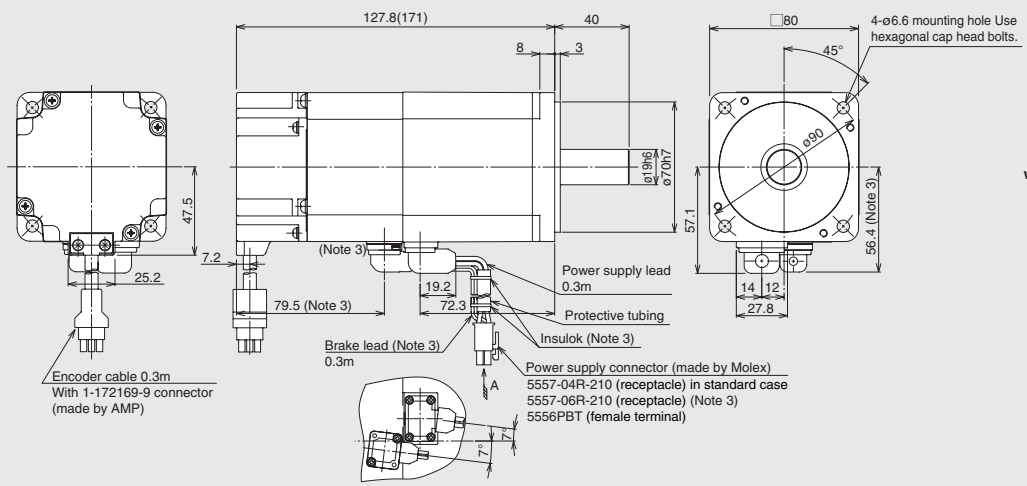
with Brake

Power supply connector pin assignment

Pin No.	Signal name
1	U phase
2	V phase
3	W phase
4	Earth
5	B1
6	B2

Model	Variable dimensions	
	L	KL
HF-KE23 (B)	90.6 (130.1)	39.3
HF-KE43 (B)	112.5 (152)	61.2

●HF-KE73(B)



Standard

Power supply connector pin assignment

Pin No.	Signal name
1	U phase
2	V phase
3	W phase
4	Earth

with Brake

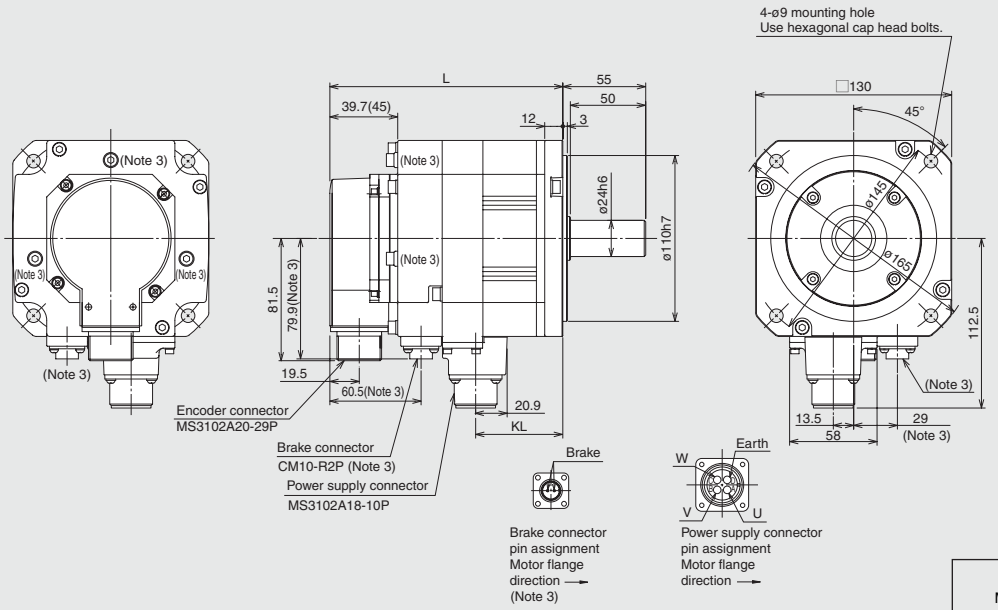
Power supply connector pin assignment

Pin No.	Signal name
1	U phase
2	V phase
3	W phase
4	Earth
5	B1
6	B2

Notes:
1. Use a friction coupling to fasten a load.
2. Dimensions inside ( ) are for the models with electromagnetic brake.
3. Only for the models with electromagnetic brake. The electromagnetic brake terminals (B1, B2) do not have the polarity.
4. For dimensions where there is no tolerance listed, use general tolerance.

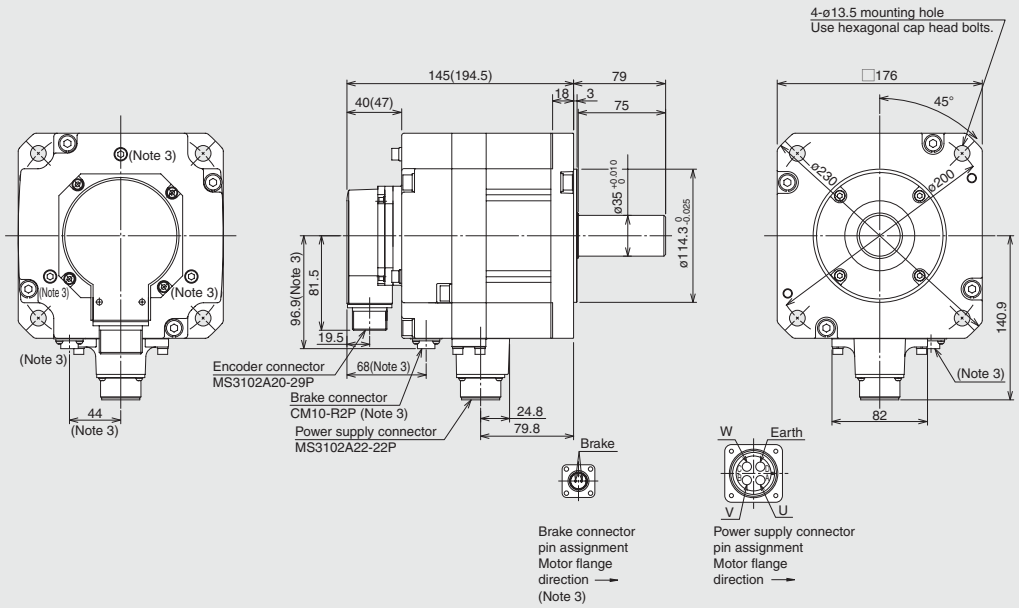
●HF-SE52(B), HF-SE102(B), HF-SE152(B)

(Unit: mm)



Model	Variable dimensions	
	L	KL
HF-SE52 (B)	120 (154.5)	57.8
HF-SE102 (B)	142 (176.5)	79.8
HF-SE152 (B)	164 (198.5)	101.8

●HF-SE202(B)



Notes:
1. Use a friction coupling to fasten a load.
2. Dimensions inside ( ) are for the models with electromagnetic brake.
3. Only for the models with electromagnetic brake. The electromagnetic brake terminals do not have the polarity.
4. For dimensions where there is no tolerance listed, use general tolerance.

Motor Special Specifications

Special shaft end specifications

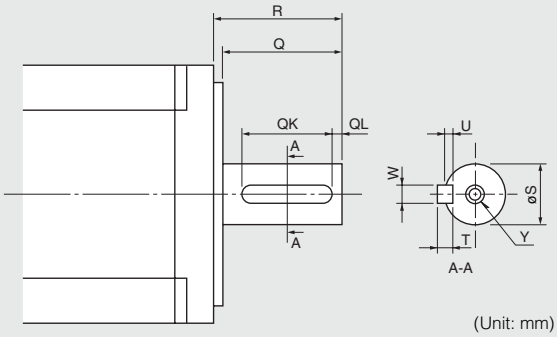
Motors with the following specifications are available.

HF-KE series

● With key (200, 400, 750W)

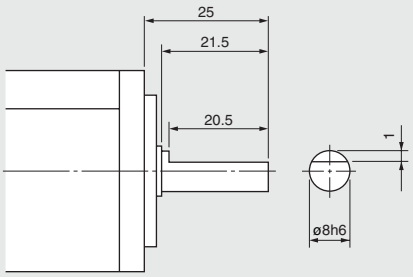
Motor model	Capacity (W)	Variable dimensions								
		T	S	R	Q	W	QK	QL	U	Y
HF-KE□K	200, 400	5	14h6	30	27	5	20	3	3	M4 screw Depth: 15mm
	750	6	19h6	40	37	6	25	5	3.5	M5 screw Depth: 20mm

(Note 1)



(Unit: mm)

● D-cut (100W)
(Note 1)



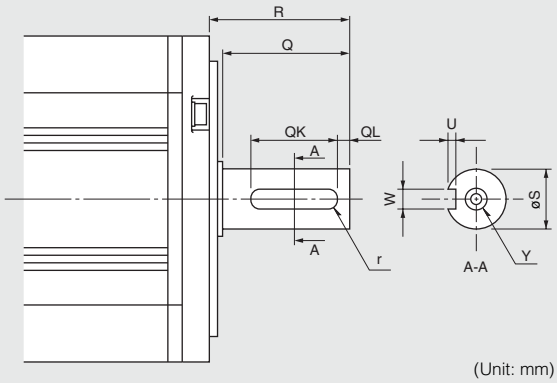
(Unit: mm)

HF-SE series

● Key way

Motor model	Capacity (kW)	Variable dimensions								
		S	R	Q	W	QK	QL	U	r	Y
HF-SE□K	0.5 to 1.5	24h6	55	50	$8\ ^{0}_{-0.036}$	36	5	$4\ ^{+0.2}_{0}$	4	M8 screw Depth: 20mm
	2.0	$35\ ^{+0.01}_{0}$	79	75	$10\ ^{0}_{-0.036}$	55	5	$5\ ^{+0.2}_{0}$	5	M8 screw Depth: 20mm

(Note 1, 2)



(Unit: mm)

Notes:
1. Cannot be used in applications that involve high frequency. Loose keys may damage the motor shaft.
2. A key is not installed. The key shall be installed by the user.

Electromagnetic brake specifications

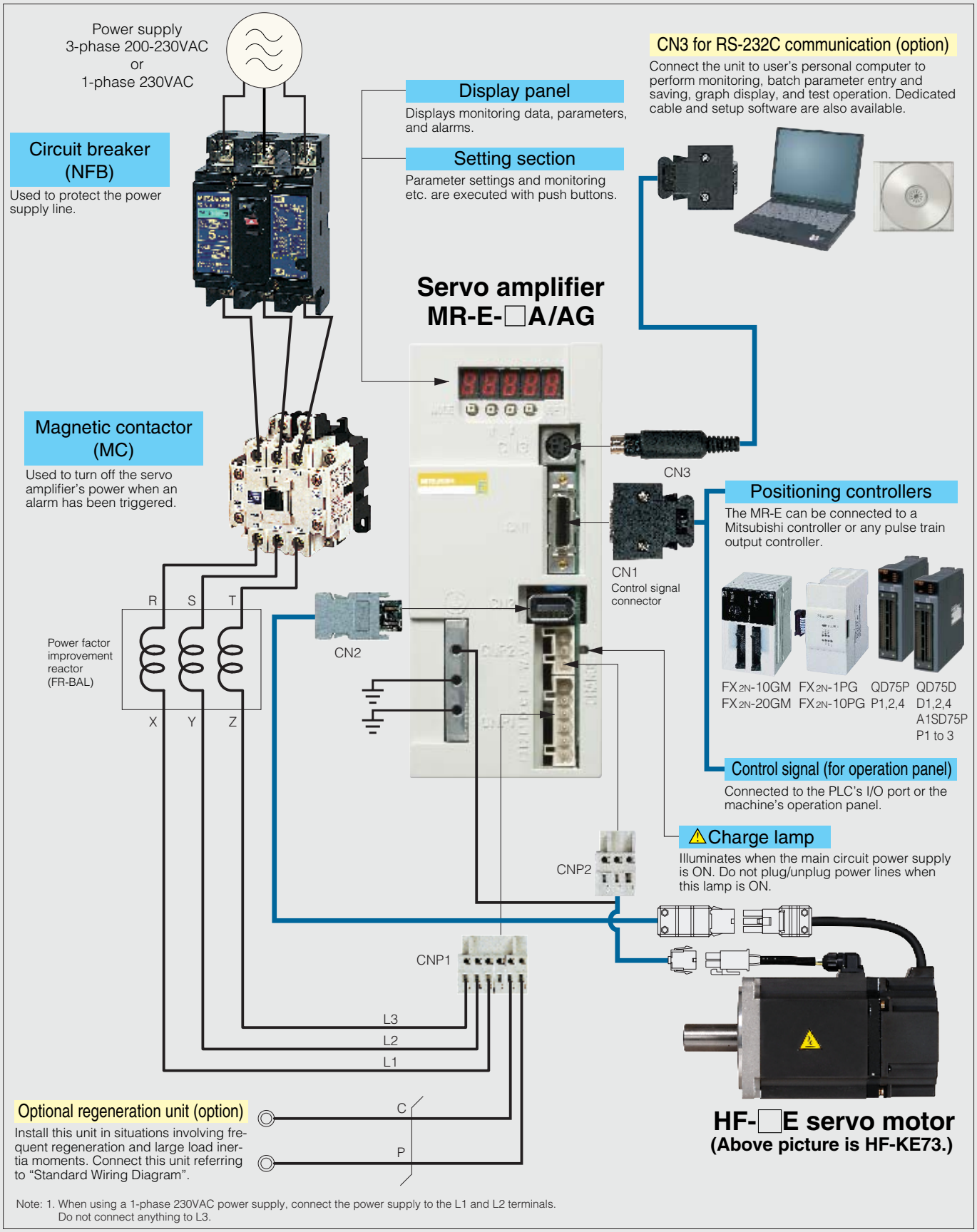
Motor model		HF-KE series				HF-SE series			
		13B	23B	43B	73B	52B	102B	152B	202B
Type		Spring-action safety brake				Spring-action safety brake			
Rated voltage		24VDC $^{0}_{-10}$%				24VDC $^{0}_{-10}$%			
Brake static friction torque	(N·m)	0.32	1.3	1.3	2.4	8.5	8.5	8.5	44
	(oz·in)	45.3	184	184	340	1200	1200	1200	6230
Power consumption (W) at 20°C (68°F)		6.3	7.9	7.9	10	20	20	20	34
Permissible braking work	(J)/time	5.6	22	22	64	400	400	400	4500
	(J)/hour	56	220	220	640	4000	4000	4000	45000
Brake life (Note 1) (Braking work per braking action)	Times	20000 (5.6J)	20000 (22J)	20000 (22J)	20000 (64J)	20000 (200J)	20000 (200J)	20000 (200J)	20000 (1000J)

Notes:
1. The brake gap cannot be adjusted. The brake life shows the time until the readjustment is needed.
2. The electromagnetic brake is for holding. It cannot be used for braking applications.

Peripheral Equipment (standard interface)

Connections with peripheral equipment

Peripheral equipment is connected to MR-E as described below.
Connectors, options, and other necessary equipment are available so that users can set up MR-E easily and begin using it right away.


Power supply
3-phase 200-230VAC
or
1-phase 230VAC
Circuit breaker (NFB)
Used to protect the power supply line.
Magnetic contactor (MC)
Used to turn off the servo amplifier's power when an alarm has been triggered.
Power factor improvement reactor (FR-BAL)
R
S
T
X
Y
Z
Display panel
Displays monitoring data, parameters, and alarms.
Setting section
Parameter settings and monitoring etc. are executed with push buttons.
Servo amplifier
MR-E-□A/AG
CN1
Control signal connector
CN2
CN3
CN3 for RS-232C communication (option)
Connect the unit to user's personal computer to perform monitoring, batch parameter entry and saving, graph display, and test operation. Dedicated cable and setup software are also available.
Positioning controllers
The MR-E can be connected to a Mitsubishi controller or any pulse train output controller.
FX2N-10GM FX2N-1PG QD75P QD75D
FX2N-20GM FX2N-10PG P1,2,4 D1,2,4
A1SD75P
P1 to 3
Control signal (for operation panel)
Connected to the PLC's I/O port or the machine's operation panel.
⚠Charge lamp
Illuminates when the main circuit power supply is ON. Do not plug/unplug power lines when this lamp is ON.
CNP2
CNP1
L3
L2
L1
C
P
Optional regeneration unit (option)
Install this unit in situations involving frequent regeneration and large load inertia moments. Connect this unit referring to "Standard Wiring Diagram".
HF-□E servo motor
(Above picture is HF-KE73.)

Note: 1. When using a 1-phase 230VAC power supply, connect the power supply to the L1 and L2 terminals.
Do not connect anything to L3.

Amplifier Specifications

MR-E-A

Servo amplifier model MR-E-			10A	20A	40A	70A	100A	200A
Servo amplifier	Power supply	Voltage/frequency (Note 1)	3-phase 200 to 230VAC 50/60Hz or 1-phase 230VAC 50/60Hz (Note 2)				3-phase 200 to 230VAC 50/60Hz (Note 2)	
		Permissible voltage fluctuation	3-phase 200 to 230VAC: 3-phase170 to 253VAC 1-phase 230VAC: 1-phase207 to 253VAC				3-phase 170 to 253VAC	
		Permissible frequency fluctuation	±5% maximum					
	Control system		Sine-wave PWM control/current control system					
	Dynamic brake		Built-in					
	Built-in regenerative resistor		None	None	Installed	Installed	Installed	Installed
	Safety features		Overcurrent shutdown, regeneration overvoltage shutdown, overload shutdown (electronic thermal), encoder fault protection, regeneration fault protection, undervoltage/sudden power outage protection, overspeed protection, excess error protection					
	Position control mode	Maximum input pulse frequency	500kpps (when using differential receiver), 200 kpps (when using open collector)					
		Positioning feedback pulse	Resolution per encoder/servo motor rotation: 16384 p/rev					
		Command pulse multiple	Electronic gear A/B multiple, A: 1 to 65535, B: 1 to 65535 1/50 < A/B < 50					
		Positioning complete width setting	0 to ±16384 pulses (command pulse unit)					
		Excess error	±2.5 rotations					
		Torque limit	Set by parameters					
	Speed control mode	Speed control range	Internal speed command 1:5000					
		Speed fluctuation rate	±0.01% maximum (load fluctuation 0 to 100%) 0% (power fluctuation ±10%)					
		Torque limit	Set by parameters					
	Structure		Self-cooling open (IP00)					Fan cooling open (IP00)
	Environment	Ambient temperature	0 to 55°C (32 to 131°F) (non freezing), storage: –20 to 65°C (–4 to 149°F) (non freezing)					
		Ambient humidity	90% RH maximum (non condensing), storage: 90% RH maximum (non condensing)					
		Atmosphere	Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust					
		Elevation	1000m or less above sea level					
		Vibration	5.9m/s^2 maximum					
	Mass (kg [lb])		0.7 (1.6)	0.7 (1.6)	1.1 (2.5)	1.7 (3.8)	1.7 (3.8)	2.0 (4.4)

MR-E-AG

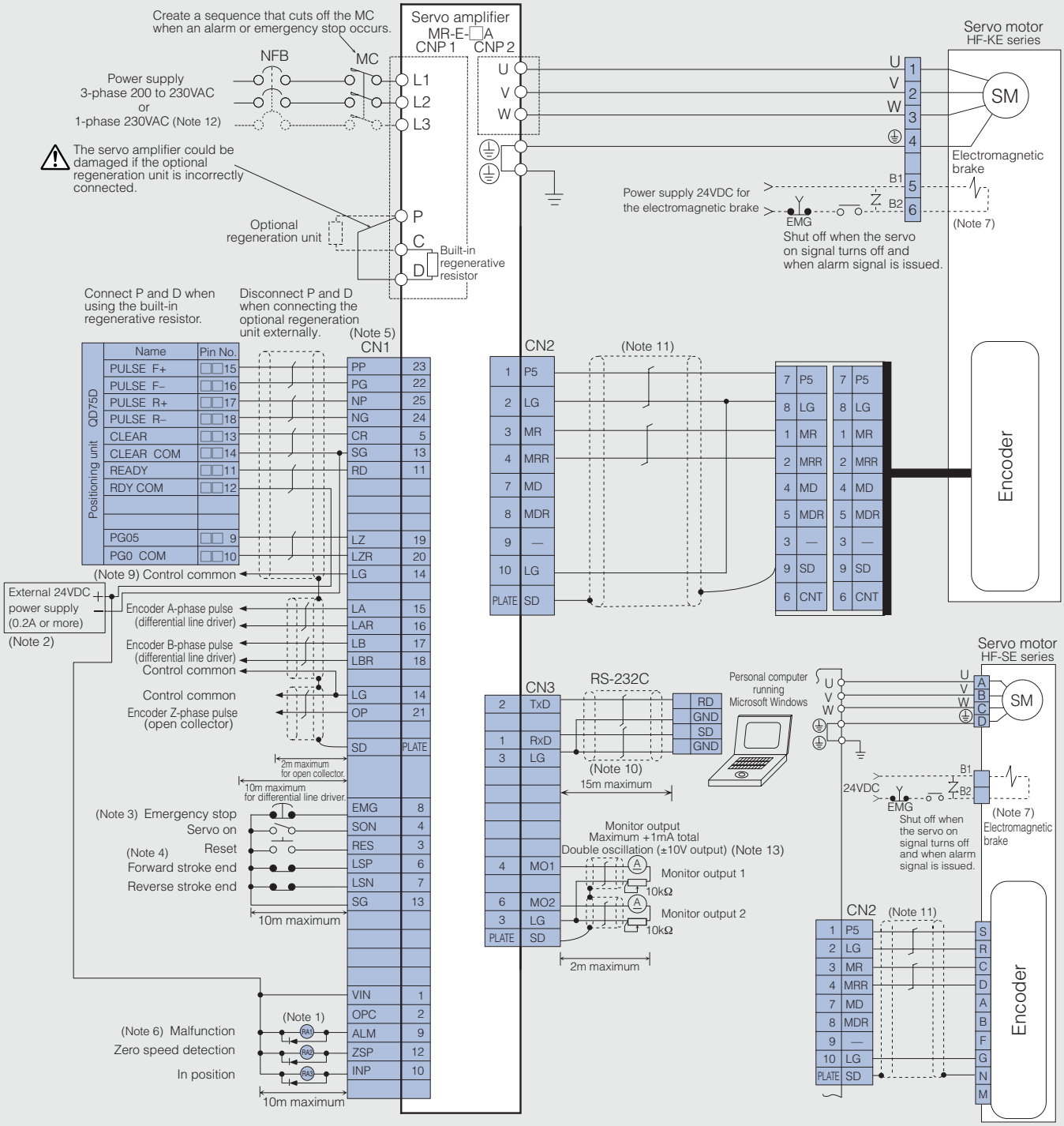
Servo amplifier model MR-E-			10AG	20AG	40AG	70AG	100AG	200AG
Servo amplifier	Power supply	Voltage/frequency (Note 1)	3-phase 200 to 230VAC 50/60Hz or 1-phase 230VAC 50/60Hz (Note 2)				3-phase 200 to 230VAC 50/60Hz (Note 2)	
		Permissible voltage fluctuation	3-phase 200 to 230VAC: 170 to 253VAC 1-phase 230VAC: 207 to 253VAC				3-phase 170 to 253VAC	
		Permissible frequency fluctuation	±5% maximum					
	Control system		Sine-wave PWM control/current control system					
	Dynamic brake		Built-in					
	Built-in regenerative resistor		None	None	Installed	Installed	Installed	Installed
	Safety features		Overcurrent shutdown, regeneration overvoltage shutdown, overload shutdown (electronic thermal), encoder fault protection, regeneration fault protection, undervoltage/sudden power outage protection, overspeed protection, excess error protection					
	Speed control mode	Speed control range	Analog speed command 1:2000, internal speed command 1:5000					
		Analog speed command input	0 to ±10VDC/rated speed					
		Speed fluctuation rate	±0.01% maximum (load fluctuation 0 to 100%) 0% (power fluctuation ±10%) ±0.2% maximum (ambient temperature 25°C±10°C [77°F±50°F]), when using analog speed command					
		Torque limit	Set by parameters or external analog input (0 to +10VDC/maximum torque)					
	Torque control mode	Analog torque command input	0 to ±8VDC/maximum torque (input impedance 10 to 12kΩ)					
		Speed limit	Set by parameters or external analog input (0 to ±10VDC/rated speed)					
	Structure		Self-cooling open (IP00)					Fan cooling open (IP00)
	Environment	Ambient temperature	0 to 55°C (32 to 131°F) (non freezing), storage: –20 to 65°C (–4 to 149°F) (non freezing)					
		Ambient humidity	90% RH maximum (non condensing), storage: 90% RH maximum (non condensing)					
		Atmosphere	Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust					
		Elevation	1000m or less above sea level					
		Vibration	5.9m/s^2 maximum					
	Mass (kg [lb])		0.7 (1.6)	0.7 (1.6)	1.1 (2.5)	1.7 (3.8)	1.7 (3.8)	2.0 (4.4)

Notes: 1. Rated output and rated speed of the servo motor used in combination with the servo amplifier are as indicated when using the power supply voltage and frequency listed. The torque drops when the power supply voltage is less than specified.
2. When the power supply is 3-phase 200VAC or 1-phase 230VAC, the mentioned torque characteristics in which the servo amplifier is combined with a servo motor is applied.

Standard Wiring Diagram

MR-E-A type: Position control operation

●Connection to QD75D (position servo, incremental)



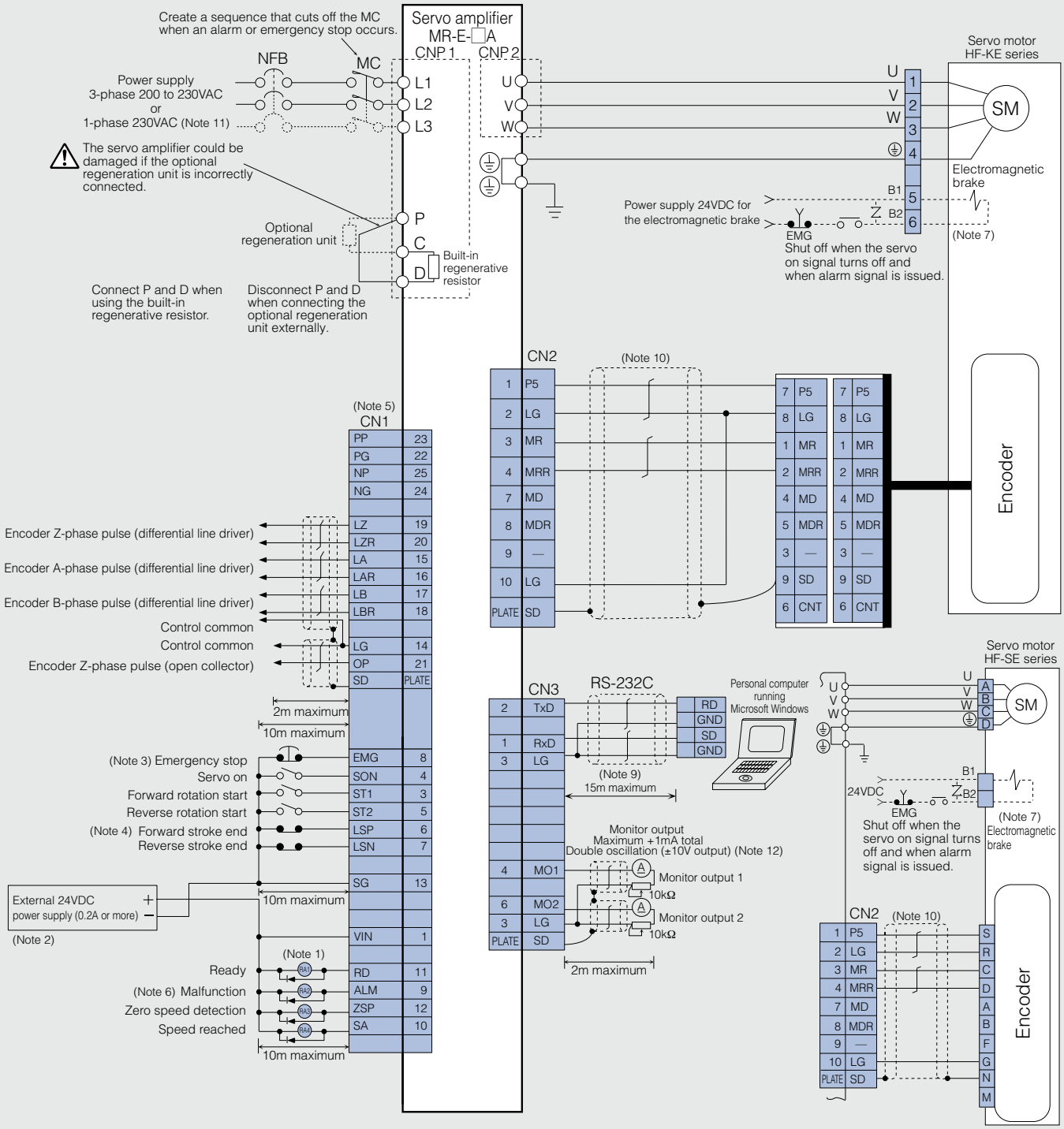
Notes:

1. Do not reverse the diode's direction. Connecting it backwards could cause the servo amplifier to malfunction that signals are not output, and emergency stop and other safety circuits are inoperable.
2. Provide a 24VDC ±10% 200mA power supply from an external source for the interface. 200mA is the value when all input/output signals are used. The current capacity can be stepped down according to the number of input/output points in use.
3. EMG (emergency stop) contact (normally closed contact) must be installed. If it is not installed, operation will be impossible.
4. LSP and LSN contacts must be closed for normal operation. If they are not closed, the commands will not be accepted.
5. Signals with the same name are connected inside.
6. Malfunction signal (ALM) is turned on during normal operation when no alarms have been triggered.
7. For the motor with an electromagnetic brake. The electromagnetic brake terminals (B1, B2) do not have the polarity.
8. Connect the shield wire securely to the plate inside the connector (ground plate).
9. This connection is not necessary for QD75D of the positioning unit. Note that the connection between LG and control common terminal is recommended to increase noise resistance depending on the positioning unit being used.
10. Always use a shielded multicore cable up to a maximum of 15m in a low noise environment. However, if the RS-232C communication is set up with a baud rate of more than 38400bps, keep the cable length to within 3m.
11. Refer to "MR-E-A/AG INSTRUCTION MANUAL" for details.
12. When using a 1-phase 230VAC power supply, connect the power supply to the L1 and L2 terminals. Do not connect anything to L3. The 1-phase 230VAC power supply is available only for MR-E-70A or smaller servo amplifiers.
13. Use the analog monitor/RS-232C branch cable (MR-E3CBL15-P) when connecting the analog monitor output 1 (MO1), analog monitor output 2 (MO2) and a personal computer.

Standard Wiring Diagram

MR-E-A type: Internal speed control operation

●Connection

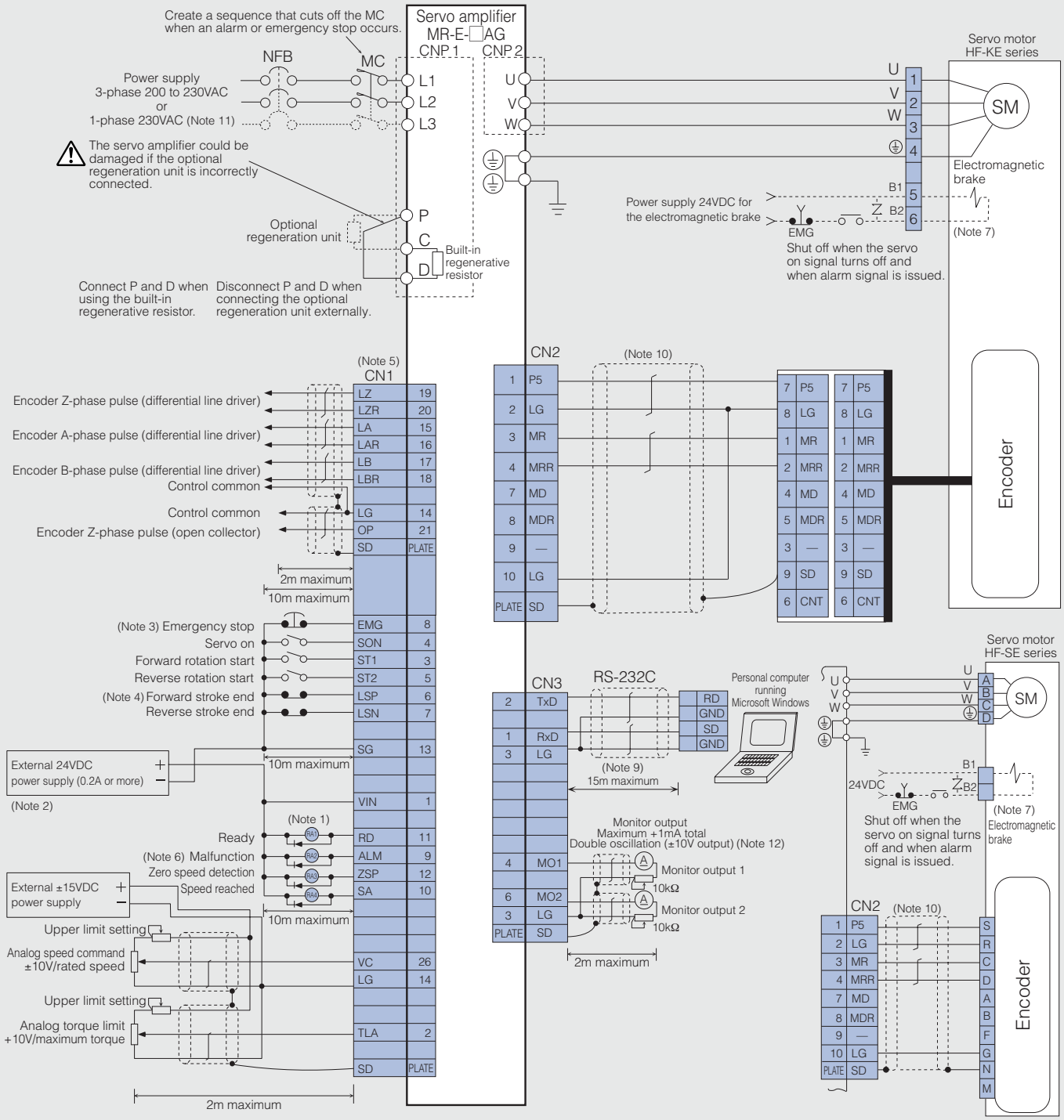


Notes:

1. Do not reverse the diode's direction. Connecting it backwards could cause the servo amplifier to malfunction that signals are not output, and emergency stop and other safety circuits are inoperable.
2. Provide a 24VDC±10% 200mA power supply from an external source for the interface. 200mA is the value when all input/output signals are used. The current capacity can be stepped down according to the number of input/output points in use.
3. EMG (emergency stop) contact (normally closed contact) must be installed. If it is not installed, operation will be impossible.
4. LSP and LSN contacts must be closed for normal operation. If they are not closed, the commands will not be accepted.
5. Signals with the same name are connected inside.
6. Malfunction signal (ALM) is turned on during normal operation when no alarms have been triggered.
7. For the motor with an electromagnetic brake. The electromagnetic brake terminals (B1, B2) do not have the polarity.
8. Connect the shield wire securely to the plate inside the connector (ground plate).
9. Always use a shielded multicore cable up to a maximum of 15m in a low noise environment. However, if the RS-232C communication is set up with a baud rate of more than 38400bps, keep the cable length to within 3m.
10. Refer to "MR-E-A/AG INSTRUCTION MANUAL" for details.
11. When using a 1-phase 230VAC power supply, connect the power supply to the L1 and L2 terminals. Do not connect anything to L3. The 1-phase 230VAC power supply is available only for MR-E-70A or smaller servo amplifiers.
12. Use the analog monitor/RS-232C branch cable (MR-E3CBL15-P) when connecting the analog monitor output 1 (MO1), analog monitor output 2 (MO2) and a personal computer.

MR-E-AG type: Speed control operation

●Connection



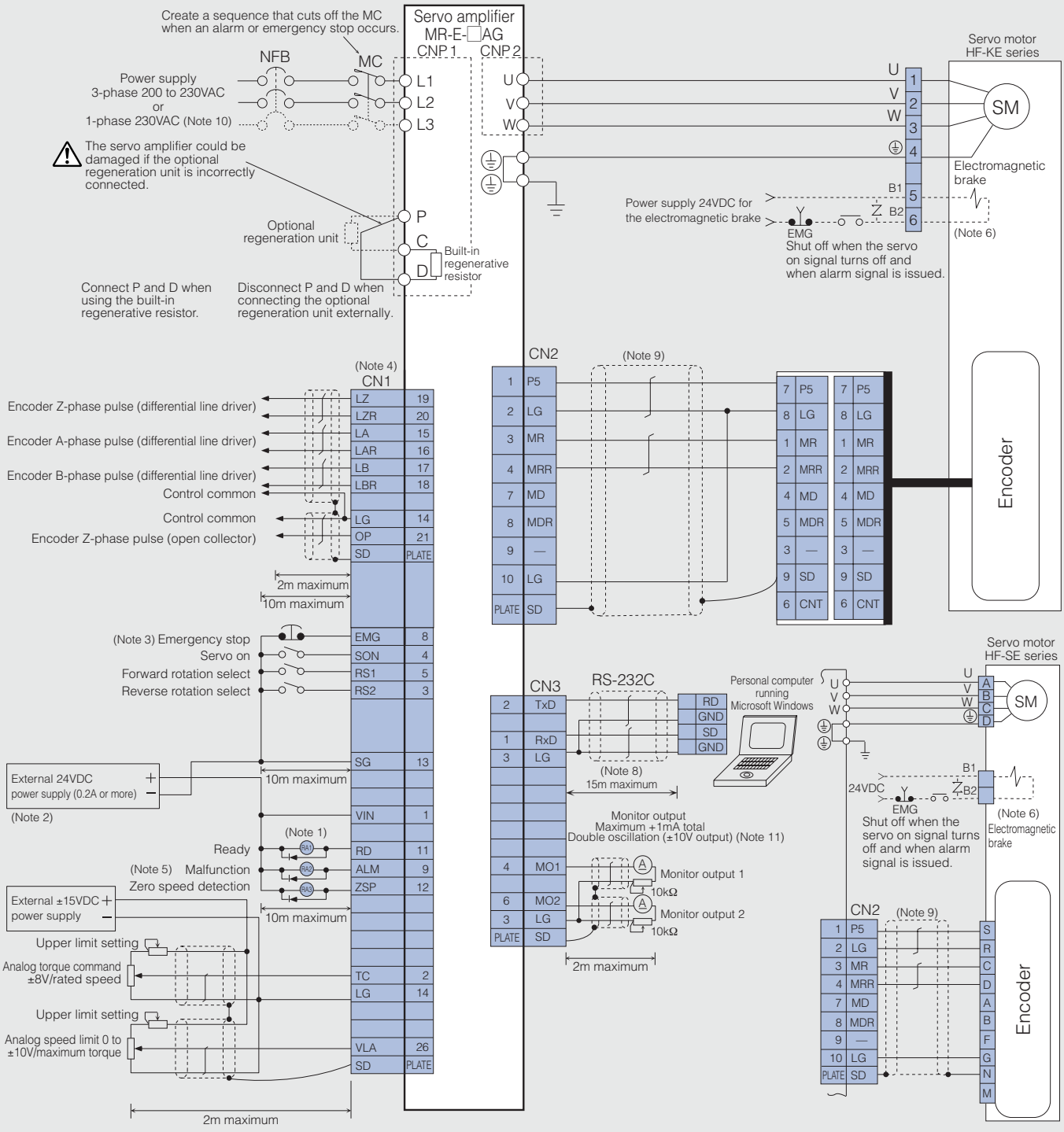
Notes:

1. Do not reverse the diode's direction. Connecting it backwards could cause the servo amplifier to malfunction that signals are not output, and emergency stop and other safety circuits are inoperable.
2. Provide a 24VDC±10% 200mA power supply from an external source for the interface. 200mA is the value when all input/output signals are used. The current capacity can be stepped down according to the number of input/output points in use.
3. EMG (emergency stop) contact (normally closed contact) must be installed. If it is not installed, operation will be impossible.
4. LSP and LSN contacts must be closed for normal operation. If they are not closed, the commands will not be accepted.
5. Signals with the same name are connected inside.
6. Malfunction signal (ALM) is turned on during normal operation when no alarms have been triggered.
7. For the motor with an electromagnetic brake. The electromagnetic brake terminals (B1, B2) do not have the polarity.
8. Connect the shield wire securely to the plate inside the connector (ground plate).
9. Always use a shielded multicore cable up to a maximum of 15m in a low noise environment. However, if the RS-232C communication is set up with a baud rate of more than 38400bps, keep the cable length to within 3m.
10. Refer to "MR-E-A/AG INSTRUCTION MANUAL" for details.
11. When using a 1-phase 230VAC power supply, connect the power supply to the L1 and L2 terminals. Do not connect anything to L3. The 1-phase 230VAC power supply is available only for MR-E-70AG or smaller servo amplifiers.
12. Use the analog monitor/RS-232C branch cable (MR-E3CBL15-P) when connecting the analog monitor output 1 (MO1), analog monitor output 2 (MO2) and a personal computer.

Standard Wiring Diagram

MR-E-AG type: Torque control operation

●Connection



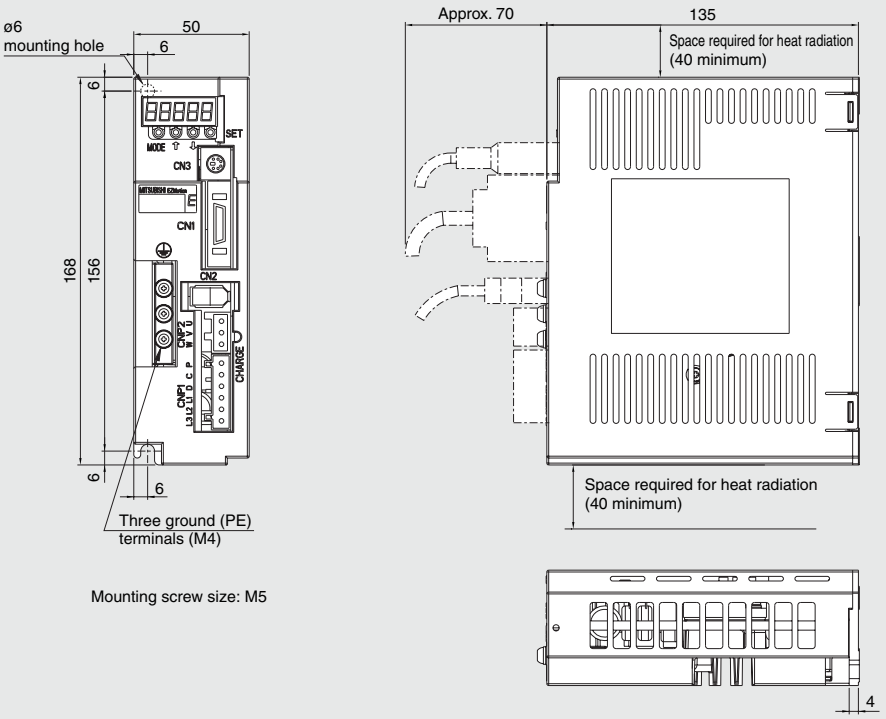
Notes:

1. Do not reverse the diode's direction. Connecting it backwards could cause the servo amplifier to malfunction that signals are not output, and emergency stop and other safety circuits are inoperable.
2. Provide a 24VDC±10% 200mA power supply from an external source for the interface. 200mA is the value when all input/output signals are used. The current capacity can be stepped down according to the number of input/output points in use.
3. EMG (emergency stop) contact (normally closed contact) must be installed. If it is not installed, operation will be impossible.
4. Signals with the same name are connected inside.
5. Malfunction signal (ALM) is turned on during normal operation when no alarms have been triggered.
6. For the motor with an electromagnetic brake. The electromagnetic brake terminals (B1, B2) do not have the polarity.
7. Connect the shield wire securely to the plate inside the connector (ground plate).
8. Always use a shielded multicore cable up to a maximum of 15m in a low noise environment. However, if the RS-232C communication is set up with a baud rate of more than 38400bps, keep the cable length to within 3m.
9. Refer to "MR-E-A/AG INSTRUCTION MANUAL" for details.
10. When using a 1-phase 230VAC power supply, connect the power supply to the L1 and L2 terminals. Do not connect anything to L3. The 1-phase 230VAC power supply is available only for MR-E-70AG or smaller servo amplifier.
11. Use the analog monitor/RS-232C branch cable (MR-E3CBL15-P) when connecting the analog monitor output 1 (MO1), analog monitor output 2 (MO2) and a personal computer.

Amplifier Dimensions

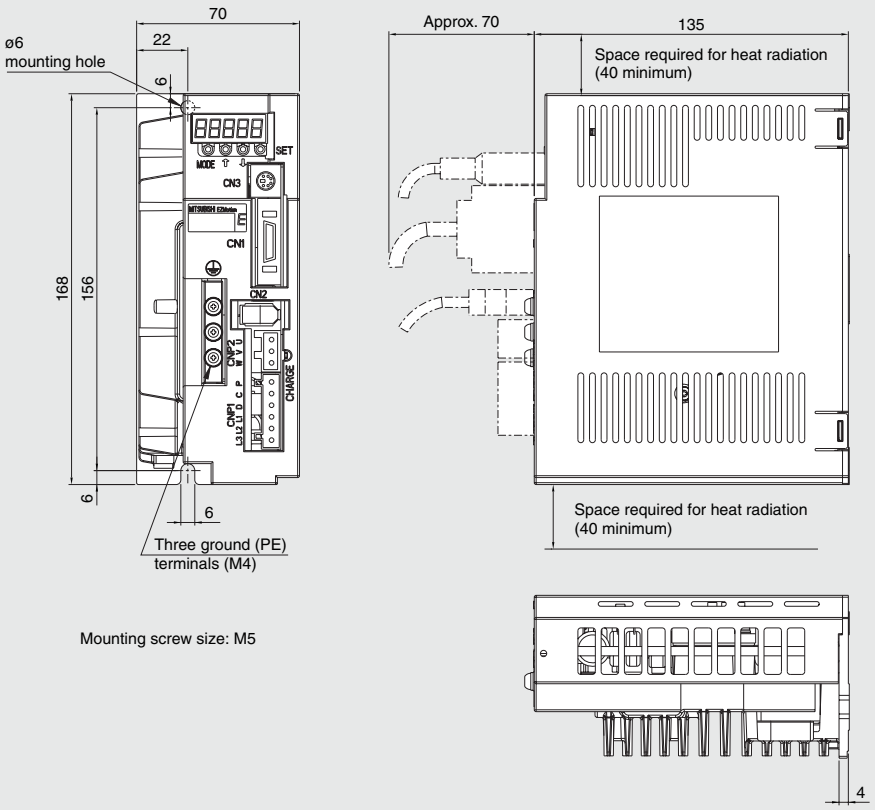
●MR-E-10A/AG, 20A/AG

(Unit: mm)



Mounting screw size: M5

●MR-E-40A/AG

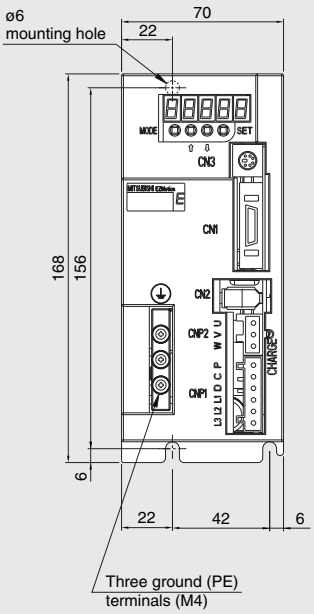


Mounting screw size: M5

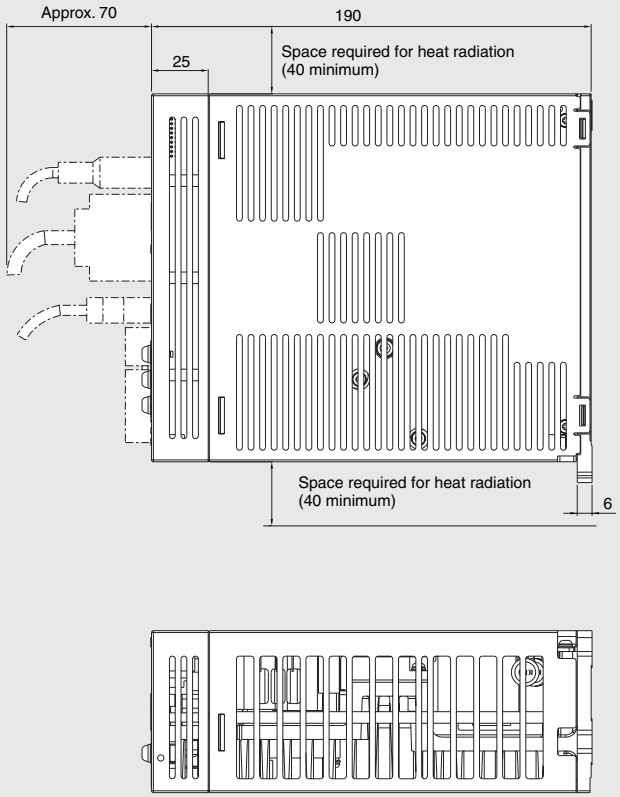
Amplifier Dimensions

●MR-E-70A/AG, 100A/AG

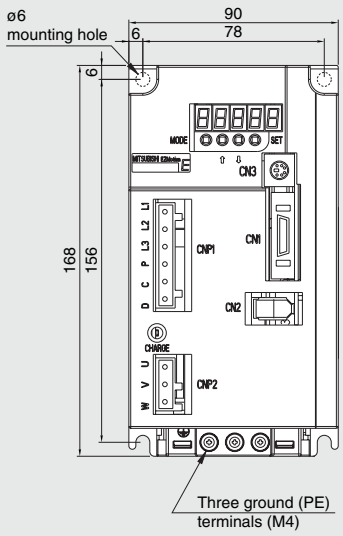
(Unit: mm)



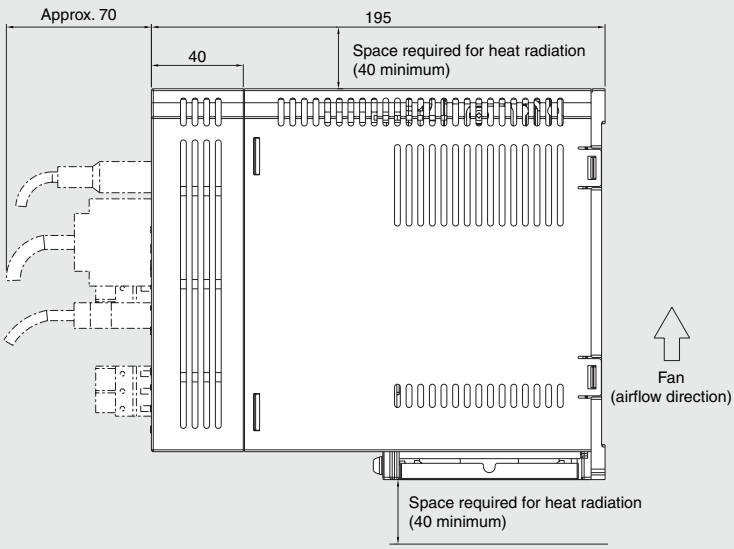
Mounting screw size: M5

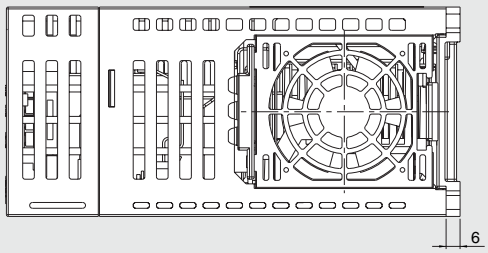


●MR-E-200A/AG



Mounting screw size: M5





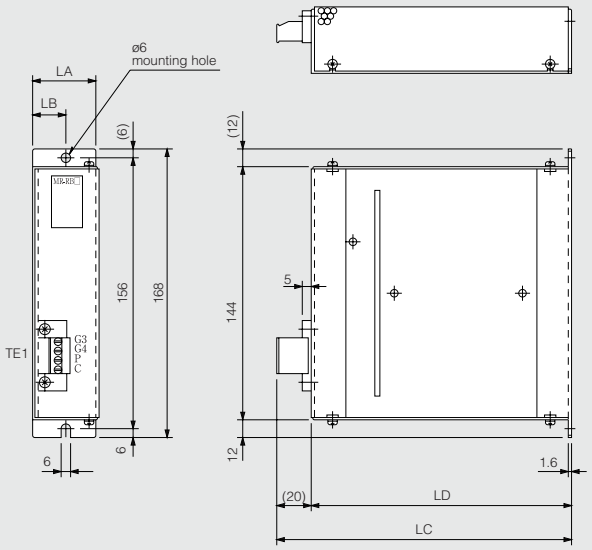
Options

● Optional regeneration unit

Servo amplifier model	Built-in regenerative resistor/tolerable regenerative power (W)	Optional regeneration unit/tolerable regenerative power (W)					
		MR-RB032	**MR-RB12**	**MR-RB30**	**MR-RB32**	**MR-RB50**	Resistance value (Ω)
MR-E-10A/AG	—	30	×	×	×	×	40
MR-E-20A/AG	—	30	100	×	×	×	40
MR-E-40A/AG	10	30	100	×	×	×	40
MR-E-70A/AG	20	30	100	×	300	×	40
MR-E-100A/AG	20	30	100	×	300	×	40
MR-E-200A/AG	100	×	×	300	×	500	13

Notes: 1. Connect the optional regeneration unit referring to “Standard Wiring Diagram”.
2. The tolerable regenerative power in the table differs from the regenerative resistor’s rated wattage.

● MR-RB032, MR-RB12



Mounting screw size: M5

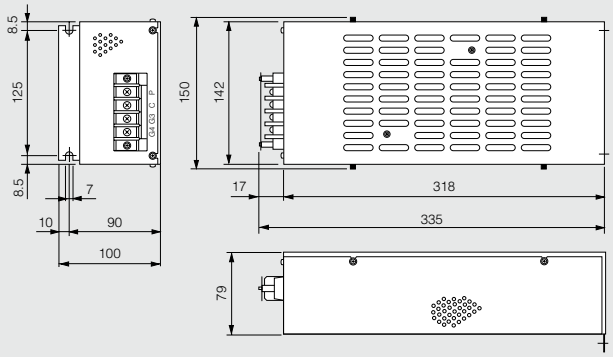
Model	Variable dimensions				Mass kg (lb)
	LA	LB	LC	LD	
MR-RB032	30	15	119	99	0.5 (1.1)
MR-RB12	40	15	169	149	1.1 (2.5)

<Terminal arrangement>

TE1
G3
G4
P
C

Terminal screw size: M3

● MR-RB30, MR-RB32



<Terminal arrangement>

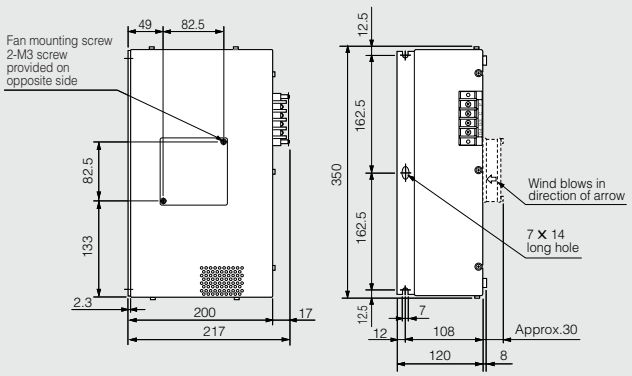
P
C
G3
G4

Terminal screw size: M4

Mounting screw size: M6

Model	Mass kg (lb)
MR-RB30	2.9 (6.4)
MR-RB32	2.9 (6.4)

● MR-RB50 (Note 4)



Mounting screw size: M6

Model	Mass kg (lb)
MR-RB50	5.6 (13)

<Terminal arrangement>

P
C
G3
G4

Terminal screw size: M4

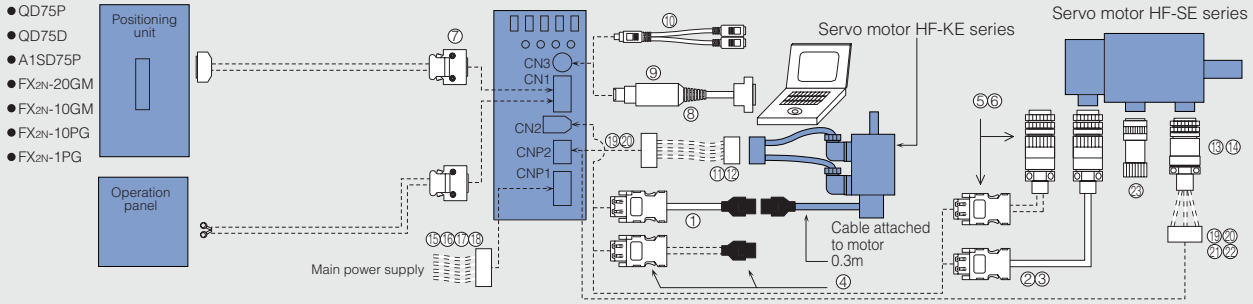
(Unit: mm)

Notes: 1. The optional regeneration unit will heat up to approx. 100°C (212°F), so do not directly mount it on a wall susceptible to heat. Use nonflammable wires or provide flame resistant treatment (use silicon tubes, etc.), and wire so that the wires do not contact the optional regeneration unit.
2. Always use twisted wires for the optional regeneration unit, and keep the length as short as possible (5m or less).
3. Always use twisted wires for a thermal sensor, and make sure that the sensor does not fail to work properly due to inducted noise.
4. When using the MR-RB50, always forcibly cool with a cooling fan (approx. 1.0m^3/min, □92). The cooling fan must be prepared by user.

Options

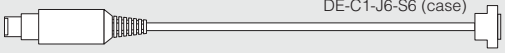
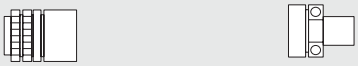
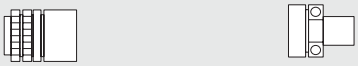
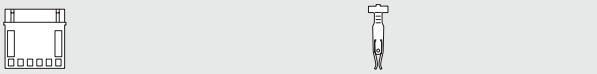
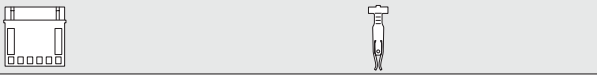
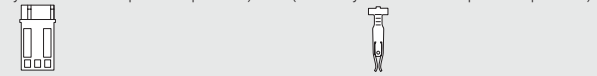
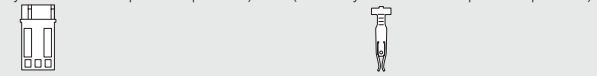
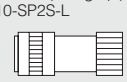
● Cables and connectors (for MR-E-□A/AG type)

Optional cables and connectors are shown in the diagram below.



Item			Model	Protection level	Description
Select one for use with CN2	①	Encoder cable for HF-KE series motor	MR-EKCBL□M-H □=cable length 2, 5, 10, 20, 30, 40, 50m (Note 1)	IP20	Amplifier-side connector (made by Molex or an equivalent product) (Note 3) Junction connector (made by AMP) 1-172161-9 (black connector housing) 170359-1 (connector pin) MTI-0002 (cable clamp, made by TOA ELECTRIC INDUSTRIAL) Encoder
			MR-EKCBL□M-L □=cable length 2, 5, 10, 20, 30m (Note 1)	IP20	
	②	(Note 4) Encoder cable for HF-SE series motor	MR-ESCBL□M-H □=cable length 2, 5, 10, 20, 30, 40, 50m (Note 1)	IP20	Amplifier-side connector (made by Molex or an equivalent product) (Note 3) Encoder connector (made by DDK) MS3057-12A (cable clamp) MS3106B20-29S (straight plug) Encoder
			MR-ESCBL□M-L □=cable length 2, 5, 10, 20, 30m (Note 1)	IP20	
	③		MR-ENECBL□M-H □=cable length 2, 5, 10, 20, 30, 40, 50m (Note 1, 5)	IP65 IP67	Backshell (made by DDK) CE02-20BS-S Plug (made by DDK) MS3106A20-29S (D190) Amplifier-side connector (made by Molex or an equivalent product) (Note 3) Cable clamp (made by DDK) CE3057-12A-3 (D265)
	④	Encoder connector set for HF-KE series motor	MR-ECNM	IP20	Amplifier-side connector (made by Molex or an equivalent product) (Note 3) Junction connector (made by AMP) 1-172161-9 (black connector housing) 170359-1 (connector pin) MTI-0002 (cable clamp, made by TOA ELECTRIC INDUSTRIAL) (Note 2)
	⑤	Encoder connector set for HF-SE series motor	MR-ECNS	IP20	Amplifier-side connector (made by Molex or an equivalent product) (Note 3) Encoder connector (made by DDK) MS3057-12A (cable clamp) MS3106B20-29S (straight plug)
	⑥		MR-ENECNS	IP65 IP67	Plug (made by DDK) MS3106A20-29S (D190) Backshell (straight) (made by DDK) CE02-20BS-S Cable clamp (made by DDK) CE3057-12A-3 (D265) Amplifier-side connector (made by Molex or an equivalent product) (Note 3)
For CN1	⑦	CN1 connector	MR-ECN1 (20 pcs/box unit)	—	Amplifier-side connector (made by 3M or an equivalent product) 10126-3000VE (connector) 10326-52F0-008 (shell kit)

Notes: 1. -H and -L indicate bending life. -H products have a long bending life.
2. AMP 172161-1 (white) can be used for the connector housing. For connector pins, 170363-1 (bulk) can be used.
3. Soldered models are as follows:
54593-1011 (connector housing), 54594-1015 (cover A), 54595-1005 (cover B), 58935-1000 (shell cover), 58934-1000 (shell body), 58937-0000 (cable clamp) and 58203-0010 (screw).
Press bonding models are as follows:
51209-1001 (connector housing), 54594-1015 (cover A), 54595-1005 (cover B), 58935-1000 (shell cover), 58934-1000 (shell body), 59351-8187 (terminal), 58937-0000 (cable clamp) and 58203-0010 (screw).
4. MR-ESCBL□M-H and -L are not IP65 compliant.
5. The encoder cable is not oil-resistant.

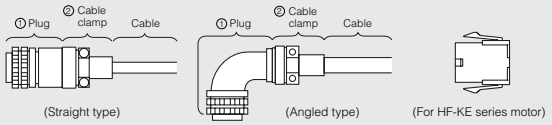
		Item	Model	Protection level	Description
For CN3	⑧	Personal computer communication cable	QC30R2 Cable length 3m	—	RS-232C option connector (Marushin electric mfg. or an equivalent product) MP371/6 (connector) (mini-DIN 6-pin male) DOS/V personal computer connector (made by Japan Aviation Electronics Industry) DE-9SF-N (connector) DE-C1-J6-S6 (case) 
	⑨	Analog monitor RS-232C connector	MR-ECN3 (20 pcs/box unit)	—	Analog monitor, RS-232C option connector (Marushin electric mfg. or an equivalent product) MP371/6 (connector) (mini-DIN 6-pin male)
	⑩	Analog monitor/RS-232C branch cable	MR-E3CBL15-P	—	RS-232C option connector (Marushin electric mfg. or an equivalent product) MP371/6 (connector) (mini-DIN 6-pin male) Analog monitor connector (Marushin electric mfg. or an equivalent product) MJ372/6 (connector) (mini-DIN 6-pin female) MJ372/6 (connector) (mini-DIN 6-pin female)
Select one for use with motor power supply (motor side)	⑪	Motor power supply connector set (motor side) for HF-KE series motor	MR-PWCNK1	IP20	Plug (made by Molex) 5559-04P-210 male terminal (made by Molex) 5558PBT3L (for AWG16)
	⑫	Motor power supply connector set (motor side) for HF-KE series motor with electromagnetic brake	MR-PWCNK2	IP20	Plug (made by Molex) 5559-06P-210 male terminal (made by Molex) 5558PBT3L (for AWG16)
	⑬	Motor power supply connector set (motor side) for HF-SE52, 102, 152	MR-PWCNS4 (Straight type)	IP65 IP67	Plug (straight) (made by DDK) CE05-6A18-10SD-B-BSS Cable clamp (made by DDK) CE3057-10A-1 (D265) 
	⑭	Motor power supply connector set (motor side) for HC-SE202	MR-PWCNS5 (Straight type)	IP65 IP67	Plug (straight) (made by DDK) CE05-6A22-22SD-B-BSS Cable clamp (made by DDK) CE3057-12A-1 (D265) 
Select one for use with amplifier power supply (for CNP1)	⑮	Amplifier power supply connector set (press bonding type) MR-E-10A/AG to 100A/AG	MR-ECNP1-A (20 pcs/box unit)	—	Connector 51240-0600 (made by Molex or an equivalent product) Terminal 56125-0118 (made by Molex or an equivalent product) 
	⑯	Amplifier power supply connector (inserted type) MR-E-10A/AG to 100A/AG	MR-ECNP1-B (20 pcs/box unit)	—	Connector 54927-0610 (made by Molex or an equivalent product)
	⑰	Amplifier power supply connector set (press bonding type) MR-E-200A/AG	MR-ECNP1-A1 (20 pcs/box unit)	—	Connector 54241-0600 (made by Molex or an equivalent product) Terminal 56125-0118 (made by Molex or an equivalent product) 
	⑱	Amplifier power supply connector (inserted type) MR-E-200A/AG	MR-ECNP1-B1 (20 pcs/box unit)	—	Connector 54928-0610 (made by Molex or an equivalent product)
Select one for use with motor power supply (for CNP2)	⑲	Motor power supply connector set (amplifier side) MR-E-10A/AG to 100A/AG (press bonding type)	MR-ECNP2-A (20 pcs/box unit)	—	Connector 51240-0300 (made by Molex or an equivalent product) Terminal 56125-0118 (made by Molex or an equivalent product) 
	⑳	Motor power supply connector (amplifier side) MR-E-10A/AG to 100A/AG (inserted type)	MR-ECNP2-B (20 pcs/box unit)	—	Connector 54927-0310 (made by Molex or an equivalent product)
	㉑	Motor power supply connector set (amplifier side) (press bonding type) MR-E-200A/AG	MR-ECNP2-A1 (20 pcs/box unit)	—	Connector 54241-0300 (made by Molex or an equivalent product) Terminal 56125-0118 (made by Molex or an equivalent product) 
	㉒	Motor power supply connector (amplifier side) (inserted type) MR-E-200A/AG	MR-ECNP2-B1 (20 pcs/box unit)	—	Connector 54928-0310 (made by Molex or an equivalent product)
For brake	㉓	Brake connector set for HF-SE series motor	MR-BKCNS1 (Straight type)	IP65 IP67	Connector (straight) (made by DDK) CM10-SP2S-L  Including contact (soldered type) CM10-#22SC (S2) -100.

Ordering Information for Customers

Ordering information for customers

● Servo motor power supply connectors

Power supply connectors are not included with the motors. Order from the previous pages, or choose from among the following recommended products. To order the following recommended products, contact the relevant manufacturers directly.



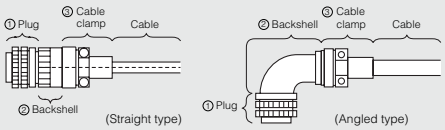
Motor model	Protection level	① Plug (made by DDK)		② Cable clamp (made by DDK)	
		Type	Model	Cable diameter (mm)	Model
HF-SE52, 102, 152	IP65 IP67 EN standards	Straight	CE05-6A18-10SD-B-BSS	8.5 to 11	CE3057-10A-2 (D265)
				10.5 to 14.1	CE3057-10A-1 (D265)
		Angled	CE05-8A18-10SD-B-BAS	8.5 to 11	CE3057-10A-2 (D265)
				10.5 to 14.1	CE3057-10A-1 (D265)
	General environment (Note)	Straight	MS3106B18-10S	14.3 (Inner diameter of bushing)	MS3057-10A
		Angled	MS3108B18-10S		MS3057-10A
HF-SE202	IP65 IP67 EN standards	Straight	CE05-6A22-22SD-B-BSS	9.5 to 13	CE3057-12A-2 (D265)
				12.5 to 16	CE3057-12A-1 (D265)
		Angled	CE05-8A22-22SD-B-BAS	9.5 to 13	CE3057-12A-2 (D265)
				12.5 to 16	CE3057-12A-1 (D265)
	General environment (Note)	Straight	MS3106B22-22S	15.9 (Inner diameter of bushing)	MS3057-12A
		Angled	MS3108B22-22S		MS3057-12A

Note: Not compliant with EN standards.

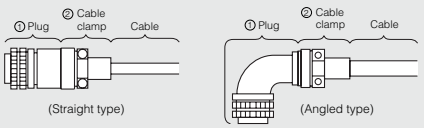
Motor model	Protection level	(made by Molex)	
HF-KE series	General environment EN standards	without Brake	Plug 5559-04P-210 male terminal 5558PBT3L (AWG16)
		with Brake	Plug 5559-06P-210 male terminal 5558PBT3L (AWG16)

● Encoder connectors

Encoder connectors are not included with the motors. Order from the previous pages, or choose from among the following recommended products. To order the following recommended products, contact the relevant manufacturer directly.



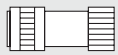
Motor model	Protection level	① Plug (made by DDK)	② Backshell (made by DDK)		③ Cable clamp (made by DDK)	
			Type	Model	Cable diameter (mm)	Model
HF-SE series	IP65, IP67	MS3106A20-29S (D190)	Straight	CE02-20BS-S	6.8 to 10	CE3057-12A-3 (D265)
			Angled	CE-20BA-S		



Motor model	Protection level	① Plug (made by DDK)		② Cable clamp (made by DDK)	
		Type	Model	Cable diameter (mm)	Model
HF-SE series	General environment	Straight	MS3106B20-29S	15.9 (Inner diameter of bushing)	MS3057-12A
		Angled	MS3108B20-29S		

● Brake connectors

Brake connectors are not included with the motors. Order from the previous pages, or choose from among the following recommended products. To order the following recommended products, contact the relevant manufacturer directly.



(Straight type)

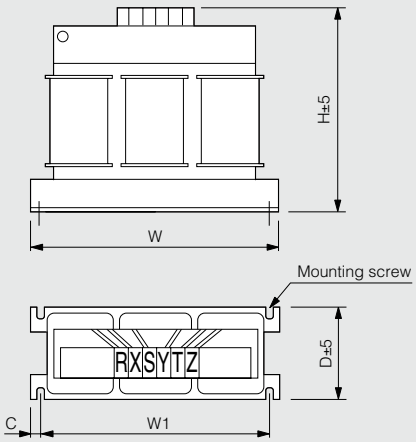
Motor model	Protection level	Connector			Contact	Cable diameter (mm)	Manufacturer
		Type	Straight pulg	Socket contact			
HF-SE	IP65 IP67	Straight	CM10-SP2S-S	CM10-#22SC (S2)-100	Soldered type	4 to 6	DDK Ltd.
			CM10-SP2S-M			6 to 9	
			CM10-SP2S-L			9 to 11.6	
			CM10-SP2S-S	CM10-#22SC (C3)-100	Press bonding type	4 to 6	
			CM10-SP2S-M			6 to 9	
			CM10-SP2S-L			9 to 11.6	

Options

● Power factor improvement reactor (FR-BAL)

This reactor enables users to boost the servo amplifier's power factor and reduce its power supply capacity.

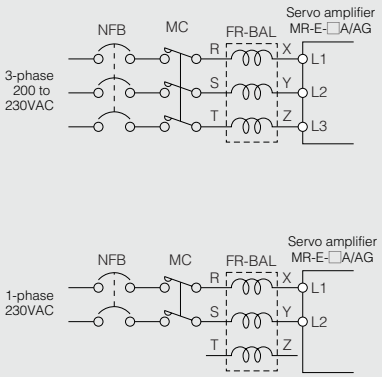
External dimensions



Servo amplifier	Model	Variable dimensions (mm)						Mounting screw size	Terminal screw size	Mass kg (lb)
		W	W1	H	D	D1	C			
MR-E-10A/AG, 20A/AG	FR-BAL-0.4K	135	120	115	59	$45^{0}_{-2.5}$	7.5	M4	M3.5	2.0 (4.5)
MR-E-40A/AG	FR-BAL-0.75K	135	120	115	69	$57^{0}_{-2.5}$	7.5	M4	M3.5	2.8 (6.2)
MR-E-70A/AG	FR-BAL-1.5K	160	145	140	71	$55^{0}_{-2.5}$	7.5	M4	M3.5	3.7 (8.2)
MR-E-100A/AG	FR-BAL-2.2K	160	145	140	91	$75^{0}_{-2.5}$	7.5	M4	M3.5	5.6 (13)
MR-E-200A/AG	FR-BAL-3.7K	220	200	192	90	$70^{0}_{-2.5}$	10	M5	M4	8.5 (19)

(Unit: mm)

Connections



Peripheral Equipment

● EMC filter

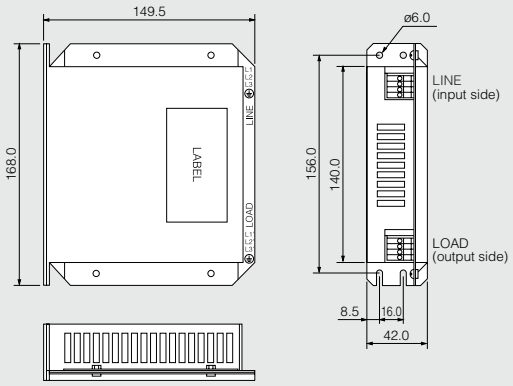
The following filters are recommended as a filter compliant with the EMC directive for the servo amplifier's power supply.

Model	Applicable servo amplifier	Fig.
SF1252	MR-E-10A/AG to MR-E-100A/AG	A
SF1253	MR-E-200A/AG	B

External dimensions (Unit: mm)

A

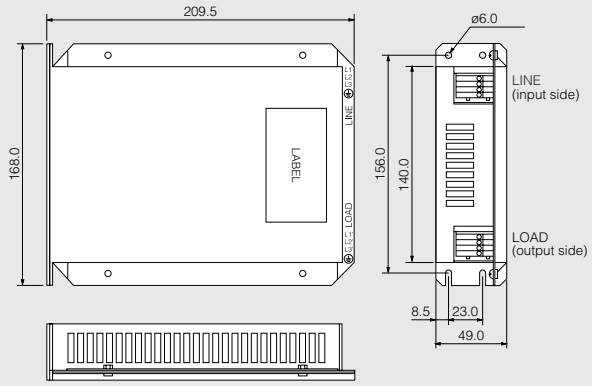
● SF1252



Model	Mass kg (lb)
SF1252	0.75 (3.1)

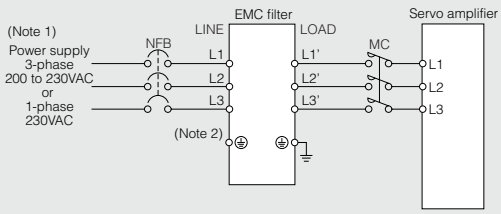
B

● SF1253



Model	Mass kg (lb)
SF1253	1.37 (3.1)

Connections



Notes: 1. When using a 1-phase 230VAC power supply, connect the power supply to the L1 and L2 terminals. Do not connect anything to L3. The 1-phase 230VAC is available only for MR-E-70A/AG or smaller servo amplifiers.
2. Connect when the power supply has earth.

● Electrical wires, circuit breakers and magnetic contactors

Servo amplifier	Circuit breaker	Magnetic contactor	Electrical wire size (mm²) (Note 1)			
			L1, L2, L3, ⏚	U, V, W, ⏚	P, C, D	B1, B2
MR-E-10A/AG	30A frame 5A	S-N10	2 (AWG14)	1.25 (AWG16)	2 (AWG14)	1.25 (AWG16)
MR-E-20A/AG	30A frame 5A	S-N10	2 (AWG14)	1.25 (AWG16)	2 (AWG14)	1.25 (AWG16)
MR-E-40A/AG	30A frame 10A	S-N10	2 (AWG14)	1.25 (AWG16)	2 (AWG14)	1.25 (AWG16)
MR-E-70A/AG	30A frame 15A	S-N10	2 (AWG14)	1.25 (AWG16)	2 (AWG14)	1.25 (AWG16)
MR-E-100A/AG	30A frame 15A	S-N10	2 (AWG14)	2 (AWG14)	2 (AWG14)	1.25 (AWG16)
MR-E-200A/AG	30A frame 20A	S-N18	2.5 (AWG14) (Note 2)	2.5 (AWG14) (Note 2)	2 (AWG14)	1.25 (AWG16)

Notes: 1. The wires in the above table are assumed to use a 600V polyvinyl chloride electrical wire having a length of 30 m.
2. When using AWG14 at an ambient temperature of 40°C or more, use heat-resistant PVC (rated 105°C [221°F] or more). Refer to the specifications in this catalog for the permissible ambient temperature of the servo amplifier and servo motor.

● Surge suppressor

Attach surge suppressors to the servo amplifier and signal cable's AC relays, AC valves and AC electromagnetic brake. Attach diodes to DC relays and DC valves.

Sample configuration

Surge suppressor: 972A-2003 504 11 (rated 200VAC, made by Matsuo Denki)

Diode : A diode with resisting pressure 4 or more times greater than the relay's drive voltage, and 2 or more times greater than the current.

● Data line filter

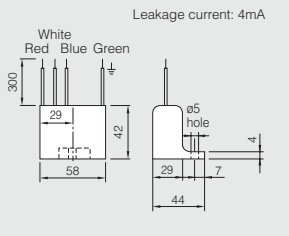
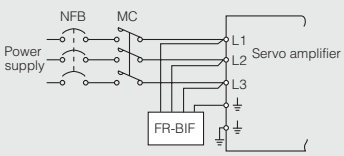
Attaching a data line filter to the pulse output cable or motor encoder cable of the pulse train output controller (QD75D, etc.) is effective in preventing noise penetration.

Sample configuration

Data line filter: ESD-SR-25 (made by NEC TOKIN), ZCAT3035-1330 (made by TDK)

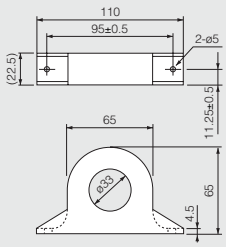
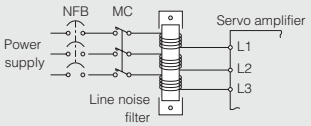
● Radio noise filter (FR-BIF)

This filter effectively controls noise emitted from the power supply side of the servo amplifier and is especially effective for radio frequency bands 10MHz or lower. Available only for input.

External dimensions	Connections
 (Unit: mm)	 Notes: 1. Cannot be connected to output side of the servo amplifier. 2. Wiring should be as short as possible. 3. Be sure to insulate the unused wire when using the FR-BIF with the 1-phase wire.

● Line noise filter (FR-BSF01)

This filter is effective in suppressing radio noise emitted from the servo amplifier's power supply side or output side, and high-frequency leakage current (zero-phase current). Especially effective in the 0.5 to 5MHz band.

External dimensions	Connections
<FR-BSF01>  Unit: mm	Wind 3-phase wires an equal number of times in the same direction, and connect them to the power supply side and output side of the servo amplifier. The effect of the filter on the power supply side rises as the number of winds increases, but generally wind the wires four times each. If the wire is thick and hard to wind, use two or more filters, and make sure that the total number of turns exceeds the above number. Make sure that the number of turns on the output side is four times or less. Do not wind the grounding (earth) wire together with the 3-phase wires. The effect of the filter will drop. Use a separate wire for grounding. 

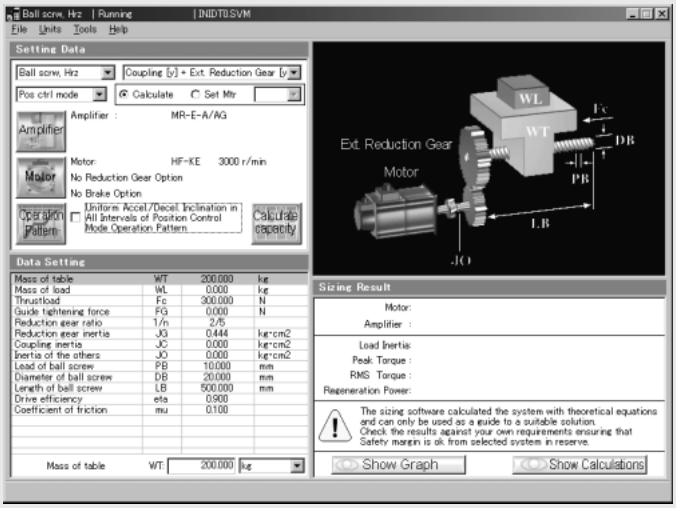
Using a Personal Computer

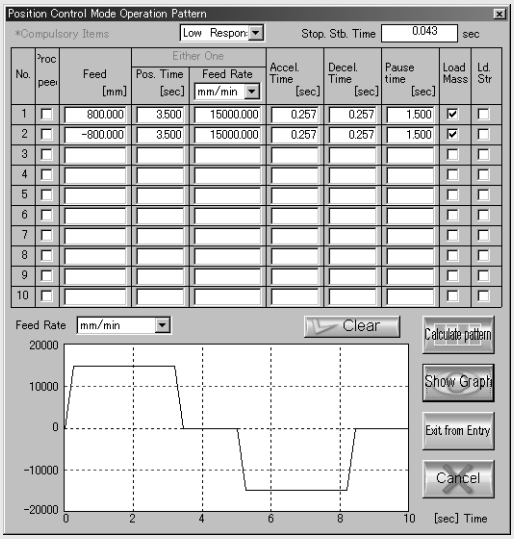
Software to facilitate a use with a personal computer is available.

<Capacity selection software>

● MRZJW3-MOTSZ111E

A user-friendly design facilitates selecting the optimum servo amplifier, servo motor (including the servo motor with a electromagnetic brake) and optional regeneration unit just by entering constants and an operation pattern into machine-specific windows.


Ball screw, Hrz | Running | INIDT0.SVM
File Units Tools Help
Setting Data
Ball screw, Hrz
Coupling [y] + Ext. Reduction Gear [y]
Pos ctrl mode
Calculate
Set Mtr
Amplifier
Amplifier : MR-E-A/AG
Motor
Motor: HF-KE 3000 r/min
No Reduction Gear Option
No Brake Option
Operation Pattern
Uniform Accel/Decel Inclination in All Intervals of Position Control Mode Operation Pattern
Calculate capacity
Data Setting
Mass of table WT 200.000 kg
Mass of load WL 0.000 kg
Thrustload Fc 300.000 N
Guide tightening force FG 0.000 N
Reduction gear ratio 1/n 2/5
Reduction gear inertia JG 0.444 kg·cm2
Coupling inertia JC 0.000 kg·cm2
Inertia of the others JO 0.000 kg·cm2
Lead of ball screw PB 10.000 mm
Diameter of ball screw DB 20.000 mm
Length of ball screw LB 500.000 mm
Drive efficiency eta 0.900
Coefficient of friction mu 0.100
Mass of table WT 200.000 kg
Ext. Reduction Gear
Motor
WL
Fc
WT
DB
PB
LB
JO
Sizing Result
Motor:
Amplifier :
Load Inertia:
Peak Torque :
RMS Torque :
Regeneration Power:
The sizing software calculated the system with theoretical equations and can only be used as a guide to a suitable solution. Check the results against your own requirements ensuring that Safety margin is ok from selected system in reserve.
Show Graph
Show Calculations



Features

(1) User-defined operation patterns can be set. The operation pattern can be selected from the position control mode operation or speed control mode operation. The operation pattern can be also displayed in the graph.

(2) The feedrate (or motor speed) and torque can be also displayed in the graph during the selection process.

(3) Compatible with Windows® 95, Windows® 98, Windows® 98 Second Edition, Windows® Me, Windows NT® Workstation4.0, Windows® 2000 Professional, Windows® XP Professional and Windows® XP Home Edition (Note 1).

● Operating conditions

Personal computer (Note 1, 2)	IBM PC/AT compatible unit running Windows® 95, Windows® 98, Windows® 98 Second Edition, Windows® Me, Windows NT® Workstation4.0, Windows® 2000 Professional, Windows® XP Professional and Windows® XP Home Edition. Processor : Pentium® 133MHz or faster (Windows® 95, Windows® 98, Windows® 98 Second Edition, Windows NT® Workstation4.0, Windows® 2000 Professional) Pentium® 150MHz or faster (Windows® Me) Pentium® 300MHz (Windows® XP Professional/Home Edition) Memory : 16MB or more (Windows® 95), 24MB or more (Windows® 98, Windows® 98 Second Edition) 32MB or more (Windows® Me, Windows NT® Workstation4.0, Windows® 2000 Professional) 128MB or more (Windows® XP Professional/Home Edition) Free hard disk space : 40MB or more
OS	Windows® 95, Windows® 98, Windows® 98 Second Edition, Windows® Me, Windows NT® Workstation4.0, Windows® 2000 Professional, Windows® XP Professional, Windows® XP Home Edition
Monitor	Capable of resolution 800×600 or more, high color (16-bit display).
Keyboard	Compatible with above personal computers.
Mouse	Compatible with above personal computers. Note that serial mice are incompatible.
Printer	Compatible with above personal computers.

● Specifications

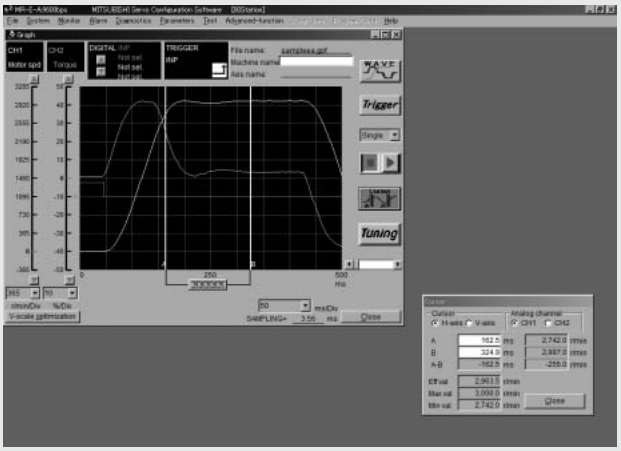
Item		Description
Types of machine component		Horizontal ball screws, vertical ball screws, rack and pinions, roll feeds, rotating tables, dollies, elevators, conveyors, other (direct inertia input) devices
Output of results	Parameter	Selected servo amplifier model, selected servo motor model, selected regenerative resistor model, load inertia moment, load inertia moment ratio, peak torque, peak torque ratio, effective torque, effective torque ratio, regenerative power, regenerative power ratio
	Printing	Prints input specifications, operation pattern, calculation process, selection process feedrate (or motor speed) and torque graphs, and selection results
	Data storage	Assigns a file name to input specifications, operation patterns and selection results, and saves them on hard disk or floppy disk, etc.
Inertia moment calculation function		Cylinder, core alignment column, variable speed, linear movement, suspension, conical, truncated cone

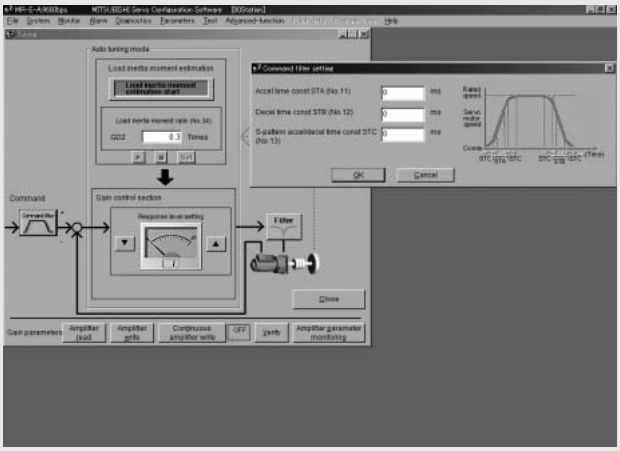
Notes:
1. Pentium is registered trademark of Intel Corporation. Windows and Windows NT are registered trademarks of Microsoft Corporation in the United States and other countries.
2. This software may not run correctly, depending on the personal computer being used.
3. The screens shown on this page are for reference and may differ from the actual screens.
4. The servo amplifiers MR-E are planned to be compatible with the software version A3 or above.

< Setup software >

● MRZJW3-SETUP154E (Note6) (E:English)

This software makes it easy to perform monitor display, diagnostic, reading and writing of parameters, and test operations from the setup with a personal computer.





Features

(1) This software can easily set up and tune your servo system with a personal computer.
Compatible personal computers: Windows® 95, Windows® 98, Windows® 98 Second Edition, Windows® Me, Windows NT® Workstation4.0, Windows® 2000 Professional, Windows® XP Professional and Windows® XP Home Edition (Note 1, 2).

(2) Multiple monitor functions
Graphic display functions are provided to display the servo motor status with the input signal triggers, such as the command pulse, droop pulse and speed.

(3) Test operations with a personal computer
Test operation of the servo motors can be performed with a personal computer.

● Operating conditions

Personal computer (Note 1, 2)	IBM PC/AT compatible unit running Windows® 95, Windows® 98, Windows® 98 Second Edition, Windows® Me, Windows NT® Workstation4.0, Windows® 2000 Professional, Windows® XP Professional and Windows® XP Home Edition. Processor : Pentium® 133MHz or faster (Windows® 95, Windows® 98, Windows® 98 Second Edition, Windows NT® Workstation4.0, Windows® 2000 Professional) Pentium® 150MHz or faster (Windows® Me) Pentium® 300MHz (Windows® XP Professional/Home Edition) Memory : 16MB or more (Windows® 95), 24MB or more (Windows® 98, Windows® 98 Second Edition) 32MB or more (Windows® Me, Windows NT® Workstation4.0, Windows® 2000 Professional) 128MB or more (Windows® XP Professional/Home Edition) Free hard disk space : 60MB or more Serial port used
OS	Windows® 95, Windows® 98, Windows® 98 Second Edition, Windows® Me, Windows NT® Workstation4.0, Windows® 2000 Professional, Windows® XP Professional, Windows® XP Home Edition
Monitor	Capable of resolution 800×600 or more, high color (16-bit display)
Keyboard	Compatible with above personal computers.
Mouse	Compatible with above personal computers. Note that serial mice are incompatible.
Printer	Compatible with above personal computers.
Communication cable	QC30R2

● Specifications

Main-menu	Functions
Monitors	Batch display, high speed monitor, graph display
Alarms	Alarm display, alarm history, display of data that generated alarm
Diagnostics	Digital I/O display, failure to rotate reason display, power ON count display, amplifier version display, motor information display, tuning data display, automatic voltage control offset display (Note 4), axis name setting
Parameters	Parameter setting, display of change list, tuning display, display of detailed information
Test operations	JOG operation, positioning operation (Note 5), operation without motor, forced digital output, program operation using simple language (Note 5)
Advanced function	Machine analyzer, gain search (Note 5), machine simulation
File operation	Data reading, saving and printing
Others	Automatic operation, help display

Notes:
1. Pentium is registered trademark of Intel Corporation. Windows and Windows NT are registered trademarks of Microsoft Corporation in the United States and other countries.
2. This software may not run correctly, depending on the personal computer being used.
3. The screens shown on this page are for reference and may differ from the actual screens.
4. The autmatic voltage control offset display is compatible only with the MR-E-AG type.
5. Positioning operation, program operation using simple language and gain search are compatible only with the MR-E-A type.
6. The servo motor HF-KE series and HF-SE series are planned to be compatible with the software version E3 or above.

MELSOFT

The Differences: Comparison with MR-J2-Super Series

The Differences (Comparison with MR-J2-Super series)

● Servo amplifier
MR-E-□A/AG series

Item		MR-E-□A/AG	MR-J2S-□A
External dimensions/Mounting method		Same as MR-J2-□A	—
Rated output		0.1 to 2kW	0.05 to 37kW
External connection	Encoder	2mm pitch input/output connector 10pins	Half pitch 20pis
	Input/output	Half pitch 26pins	Half pitch 20pins, 2pcs
	RS-232C	MiniDIN 6pins	Half pitch 20pins
	Power supply motor	Connector	Terminal block
Power supply		Common power supply for main circuit and control circuit	Independent power supplies for main circuit and control circuit
24VDC power supply for input/output interface		None	Built-in
Communication interface		RS-232C only	Selecting RS-232C or RS-422 possible
Digital input/output		6 inputs / 4 outputs (A type)	9 inputs / 6 outputs
Analog input		2 channels (AG type)	2 channels

● Servo motor

Item	HF-□E	HC-□FS
Encoder resolution	INC 16384 p/rev	ABS 17bits (131072 p/rev)
External dimensions/Mounting method	Compatible (Same as HC-□FS) (Note1)	—
Motor power supply connector	HF-KE is compatible with HC-KFS HF-SE is incompatible with HC-SFS	—
Brake connector		
Encoder connector	Compatible (Same as HC-□FS)	—
Rated output	0.1 to 2kW	0.05 to 37kW
Protection level	Same as HC-□FS	—

Note: The total length dimensions differ.

Connectivity with MR-J2-Super

The MR-E series servo amplifiers cannot be connected to the motors of the MR-J2-Super series.
The HF-□E series motors cannot be connected to MR-J2-Super series servo amplifiers.

Connectivity with existing servo motors (HC-□E Series)

Existing servo motors (HC-□E Series) can be used.

Cautions Concerning Use

To ensure safe use

- To use the products given in this catalog properly, always read the "Installation Guide" and "MR-J3 INSTRUCTION MANUAL" before starting to use them.
- These products have been manufactured as a general-purpose part for general industries, and have not been designed or manufactured to be incorporated in a device or system used in purposes related to human life.
- Before using the products for special purposes such as nuclear power, electric power, aerospace, medicine, passenger movement vehicles or underwater relays, contact Mitsubishi.
- These products have been manufactured under strict quality control. However, when installing the product where major accidents or losses could occur if the product fails, install appropriate backup or failsafe functions in the system.

Cautions concerning use

Transport and installation of motor

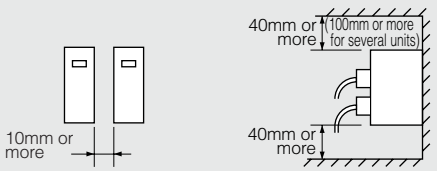
- Protect the motor or encoder from impact during handling. When installing a pulley or coupling, do not hammer on the shaft. Impact can damage the encoder. In the case of the motor with a key, install a pulley or coupling with the screw of shaft-end. Use a pulley extractor when taking off the pulley.

- Do not apply a load exceeding the tolerable load onto the servo motor shaft. The shaft could break.

Installation

- Avoid installation in an environment in which oil mist, dust, etc. are in the air. When using in such an environment, enclose the servo amplifier in a sealed panel. Protect the motor by furnishing a cover for it or taking similar measures.
- Mount the amplifier vertically on a wall.
- When installing several amplifiers in a row in a sealed panel, leave 10mm or more open between each amplifier. When installing several units in a row, leave 100mm or more open in the upward direction, and 40mm or more in the downward direction, or install a fan to prevent heat from accumulating.

  When using one amplifier, leave 40mm or more open in the upward and downward directions.



- For a single motor, the motor can be mounted horizontally or vertically. When mounting vertically (shaft-up), take measures on the machine side to ensure that oil from the gear box does not get into the motor.
- Do not touch the servo motor during or after operation until it has had sufficient time to cool.

  The motor could be very hot, and sever burns may result from touching the motor.
- The optional regeneration unit becomes hot (temperature rise of 100°C (212°F) or more) with frequent use. Do not install within flammable objects or objects subject to thermal deformation. Take care to ensure that electrical wires do not come into contact with the main unit.
- Carefully consider the cable clamping method, and make sure that bending stress and the stress of the cable's own weight are not applied on the cable connection section.
- If using in an application where the servo motor moves, select the cable bending radius according to the required bending life and wire type.
- Fix the power supply and encoder cables led out from the servo motor onto the servo motor so that they do not move. Failure to do so could result in disconnections.

  Do not modify the connector or terminals, etc., on the end of the cable.

Grounding

- Securely ground to prevent electric shocks and to stabilize the potential in the control circuit.
- To ground the servo motor and servo amplifier at one point, connect the grounding terminals of each unit, and ground from the servo amplifier side.
- Faults such as a deviation in position could occur if the grounding is insufficient.

Wiring

- When a commercial power supply is applied to the amplifier's output terminals (U, V, W), the amplifier will be damaged. Before switching the power on, perform thorough wiring and sequence checks to ensure that there are no wiring errors, etc.
- When a commercial power supply is applied to the motor's input terminals (U, V, W), the motor will be damaged. Connect the motor to the amplifier's output terminals (U, V, W).
- Match the phase of the motor's input terminals (U, V, W) to the amplifier's output terminals (U, V, W) before connecting. If they are not the same, the motor control cannot be performed.
- In the case of position or speed control mode, connect the stroke end signals (LSP, LSN) to the common terminal (SG). If the signals are invalid, the motor will not rotate.
- Connect P and D on the power supply connector (CNP1) when using the built-in regenerative resistor.

Factory settings

- All available motor and amplifier combinations are predetermined. Confirm the models of the motor and amplifier to be used before installation.
- Select the control mode, motor series and motor capacity with parameter No. 0.
- For MR-E-□A, default value is set to the position control mode. Change the setting value when using the speed control mode.
- For MR-E-□AG, default value is set to the speed control mode. Change the setting value when using the torque control mode.
- Change parameter No. 0 when using the optional regeneration unit. The optional regeneration unit is disabled as the default, so the parameter must be changed to increase the regeneration performance.

Cautions Concerning Use

Operation

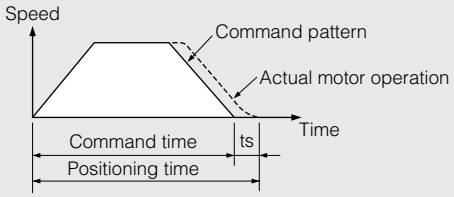
- When a magnetic contactor (MC) is installed on the amplifier's primary side, do not perform frequent starts and stops with the MC. Doing so could cause the amplifier to fail.
- Turn MC OFF if an alarm occurs.
- As for the amplifier, when a trouble occurs, the amplifier's safety features are activated, halting output, and the dynamic brake instantly stops the motor.
- When using a motor with an electromagnetic brake, do not apply the brake when the servo is on. Doing so could cause an amplifier overload or shorten brake life. Apply the brake when the servo is off.

Precautions for Choosing the Products

- Mitsubishi will not be held liable for damage caused by factors found not to be the cause of Mitsubishi; opportunity loss or lost profits caused by faults in the Mitsubishi products; damage, secondary damage, accident compensation caused by special factors unpredictable by Mitsubishi; damages to products other than Mitsubishi products; and to other duties.

Cautions concerning model selection

- Select a motor with a rated torque above the continuous effective load torque.
- Design the operation pattern in the command section so that positioning can be completed, taking the stop setting time (ts) into account.



- The load inertia moment should be below the recommended load inertia moment ratio of the motor being used. If it is too large, desired performance may not be attainable.

MEMO

⚠ Safety Warning

To ensure proper use of the products listed in this catalog, please be sure to read the instruction manual prior to use.

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